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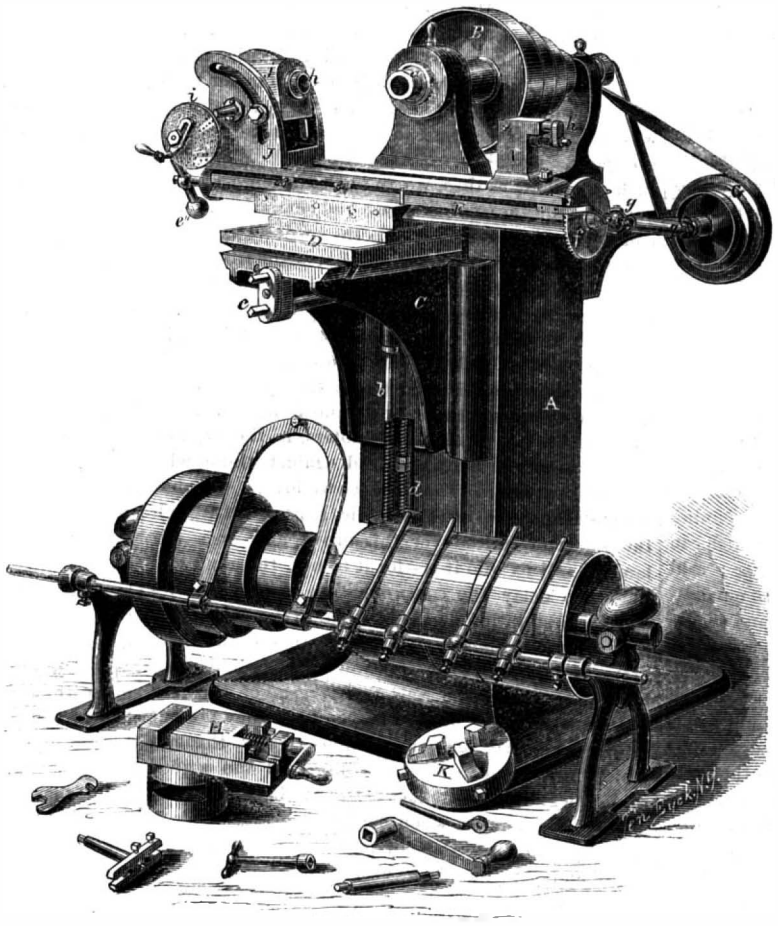
Improved Universal Milling Machine.

The machine represented in our engraving is adapted to the making of a great variety of tools required by gun-makers and machinists ; such as twist drills, mills of all shapes, with straight or spiral teeth, and cutters for geers or other work. It will cut a tapering or conical mill with either right or left hand spiral teeth, and is designed to supply the place of the common index milling machine used by gun-makers, but is adapted to a greater variety of work. The frame A, is cast hollow in one piece and has shelves also cast in it, forming a cupboard to hold tools.

In the upper part of the frame is the main arbor *a*, made of steel, running in a Babbitt-metal box with an anti-friction curve at the front end and in a straight, bronze box at the rear end ; it can be closed up to compensate for wear. The front bearing can be tightened by forcing up the pulley, B, with a nut provided for the purpose. Upon the front side of the frame, A, a knee, C, is fitted to slide, which can be moved by a screw, *b*, connecting it with a projection from the frame. This screw is vertical and is connected with a horizontal shaft by beveled geers, being operated by a crank on the squared end of the horizontal shaft, *c*, that projects from the forward part of the knee. Behind this vertical screw, is another rod, *d*, which is attached firmly to the knee, and passes freely through a hole in the same projection in front of the frame which answers as a nut for the first-named screw. This constitutes a stop motion which limits the rise or fall of the knee and through it the depth to which the work is milled. Upon the top of the knee C, a slide, D, is fitted, on a line parallel with the main arbor, to be moved by the screw, *e*. To the upper part of this sliding piece the casting, E, is attached, that moves on its center horizontally only, a graduated arc showing its position. This piece can be clamped very firmly to the one below it. In this also the long carriage, F, shown in the cut, is fitted to slide, and is moved in the usual way by a screw working through a nut in it with a handle, *e″*, on one end. On the opposite end is a bevel geer, *f*, connecting with another on a short shaft projecting from the side of the carriage. A connection is made between this short shaft and that of the feed cone, G, by two Hook's joints, *g*, and a shaft between them, made of two pieces, one sliding into the other with a feather let in to one of them so that their relative positions may not be changed. This feeding arrangement is thrown in or out, by a lever, and can be set to stop it at any point. A vise, H, shown at the foot of the machine, is provided, which can be attached to the carriage, F, thereby rendering the tool equivalent to a plain milling machine with the advantage of being able to feed the carriage at any angle. At one end of the carriage is a stand, I, fitted to slide in a groove, with a center, *h″*, in its top ; this stand can be fastened at any point ; opposite to it is a head, J, having a hollow arbor, *h*, in which a centre can be placed to be on a line with the centre *h″*, in the stand described. Between these centres is placed the work to be milled, in which any variation of spiral or its equivalent can be made by means of the index, *i*, on the side of the head that is connected with the arbor by two miter geers, a worm, and worm wheel. The arbor in the head can also be connected with the screw that moves the carriage by spur wheels engaging with the miter geers and worm wheel just mentioned. When this is done, the arbor, *h*, revolves as the carriage advances, and thus gives a spiral motion to any piece held between the centres or on an arbor in the head. Changes of spur geers are furnished by which any spiral can be obtained. The machine ordinarily cuts right hand spirals, but by inserting an extra geer a left-hand motion can be given to it. The part, *j*, of the head, J, supporting the arbor, can be raised to any angle and set, by divisions upon the arc through which it moves. This arrangement renders the cutting of tapering spirals as easy as straight ones. It can also be depressed below the line of the centres for the purpose of cutting the teeth in tapering rimers. A small universal chuck, K, is fitted to screw on the arbor, *h*, and is found convenient for cutting face mills, or doing any work on or near the ends of small cylindrical pieces. The jaws in this chuck run through to the backside so as to hold an arbor firmly. A spiral or twist drill, which is too long to go between the centers, may be milled by removing the center in the head and substituting the chuck, K ; as the arbor which the chuck screws is hollow, a drill of any length, not exceeding $1\frac{1}{16}$th inches in diameter can be made, the end projecting from the chuck being taken by a center in the stand, I. The usual tables, showing the changes of geers for spirals, and the other divisions made by the index plates, accompany the machine. The overhead pulleys are arranged for two belts to reverse the motion of the main arbor.

These machines are in operation at several of the private armories. Further information concerning them can be obtained by addressing the makers, J. R. Brown & Sharpe, 115 South Main street, Providence, R. I.



J. R. BROWN & SHARPE'S UNIVERSAL MILLING MACHINE.

Portable Soup.

A new species of food for army uses, called the extract of flesh, is highly commended for invalid soldiers and others. A half ounce represents the whole amount of nutriment in a pound of fresh beef. The method of preparation is thus described :—"The whole process consists in taking lean beef, free of bone and fat, chopping it fine as when used for sausages or mince meat, and mixing it with its own weight of cold water. It is then slowly heated to boiling and allowed to boil briskly for a moment or two, when it is strained through cotton cloth to separate the coagulated albumen and fibrin. The evaporation to dryness of the solution must be conducted at a low temperature by a water bath or a steam heater. The powder is readily soluble in water. When properly dried it will keep for months. Enough can be stored in an ordinary watch-fob to sustain a soldier a week. An ordinary porcelain-lined kettle holding a gallon is sufficient for the preparation of the extract. To dry the solution, put the kettle into a larger vessel containing hot water. With but little trouble on the part of their friends, almost every soldier might be provided with some of this valuable nutriment."—*Exchange.*

[This is by no means a new species of food. This is the portable soup described on page 416 of Liebig's "Letters on Chemistry." He states that it is easily soluble in cold water, and when dissolved in about thirty-two parts of hot water with the addition of some salt, it has the taste and peculiarities of excellent soup. The intensity of the flavor of the dry extract of flesh is very great. It does not keep so well, however, as Borden's famous meat-biscuit.

THE PNEUMATIC POST —We learn from the London *Times* that the system of conveying parcels in tubes —illustrated on page 209, Vol. V. (new series), SCIENTIFIC AMERICAN, will soon be in operation in London for the public. A pipe, two feet 9 inches in diameter, has been laid from the central station of the London and North-western Railway to the General Post-office—a distance of half a mile—and the mails are to be delivered through this tube between the post-office and the railway.

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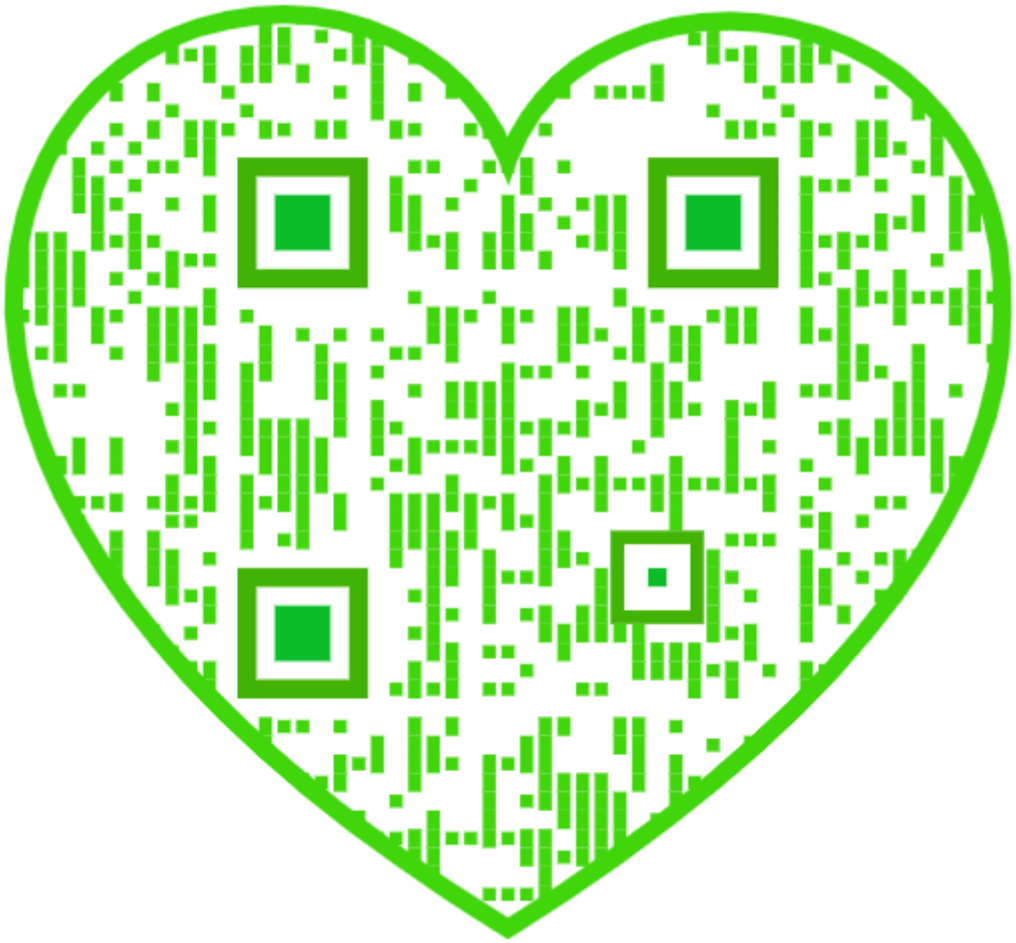

RECENT AMERICAN INVENTIONS.

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week. The claims may be found in the official list.

Hoisting Apparatus.—This invention is based on the principle of the differential wheels, and its object is to produce a hoisting apparatus of great power in a small compass. The invention consists in the arrangement of two cog wheels with a different number of teeth ; that one with the largest number of teeth being stationary and the other being secured to the axle of the drum of the hoisting apparatus or to the inner surface of said drum, in combination with two other cog wheels having the same number of teeth and attached to a tumbling shaft which is carried round the center of the drum shaft in such a manner that, by the combined action of the two wheels on the tumbling shaft and the differential wheels, a slow rotary motion is imparted to the drum shaft, and that the power applied to the tumbling shaft is multiplied in proportion to the number of teeth of the gear wheel on the drum shaft divided by the difference between the number of teeth of said wheel and that of the stationary wheel. This invention is applicable, with peculiar advantage, to the steering gear of vessels. J. F. Rochow of No. 16 Water street, Brooklyn, N. Y., is the inventor of this improvement, and he has secured his invention by patents in the United States and in England through the Scientific American Patent Agency.

Skate Fastening.—This invention relates to a new and improved mode of attaching the back part of the skate to the heel of the boot or shoe, and consists in having a hook at the back part of a heel plate attached to the skate, and a plate provided with two parallel slots attached to the heel of the boot or shoe, the parts being so arranged that the hook on the skate may be passed through the slots in the plate which is attached to the heel of the boot or shoe and a perfect lock obtained. David Maydole, of Norwich, N. Y., is the inventor of this improvement.

Refining Lard.—The object of this invention is to reduce the temperature of lard as the same passes from the heating pan to the cooling vat, to such a degree that it requires but little stirring to bring it to the desired consistency. The invention consists in the application or use in an apparatus for refining lard, of a worm inclosed in a cask or tub, which can be wholly or partially filled with cold water ; said worm being connected at one end to a pipe emanating from the bottom of the heating pan and at the other end to a spout discharging into the cooling vat in such a manner that the lard, in passing from the heating pan to the cooling vat, is cooled down to such a degree that very little stirring in the cooling pan is needed to bring the lard to the desired consistency fit to be packed in suitable tubs, barrels or other vessels ; the invention consists also in the arrangement of a regulating cock inserted into a pipe leading from the bottom of the cask which contains the worm, to the waste-water or over-flow pipe in combination with the water-supply pipe and with the heating pan in such a manner that by opening or closing said cock the quantity of water in the cask and with it the temperature of the lard passing through the worm can be regulated, keeping the same at such a degree of heat that it flows freely from the worm without stopping up its own passage, and at the same time the temperature is reduced so that it requires but very little stirring to bring the lard to the desired consistency. Wm. J. Wilcox, of New York city, is the inventor of this device.

Elongated Bullets.—This invention consists in the combination with an elongated expanding bullet of a headed pin and a conical expanding disk, the disk having its concave side against the base of the bullet, and the pin entering the cavity thereof, and operating to produce the flattening of the disk, by which it is caused to expand against the walls of the gun and enter the rifle grooves thereof. It also consist in so fitting the pin to the cavity of the bullet to produce the expansion of the cylindrical portion of the exterior thereof that the forward part of the said portion shall be first expanded, thus causing the friction against the bore of the gun to begin as far forward as the bullet shall bear against the bore, by which means the bullet will be more quickly and perfectly upset, its friction more evenly distributed and its center of gravity made more nearly to coincide with the center of the bore of the gun—all conditions necessary to accuracy. Elijah D. Williams, of Philadelphia, Pa., is the inventor of this improvement,

Blasting Compound.—This invention relates to the blasting compound for which the same inventors obtained Letters Patent No. 34,654, dated March 11, 1862. The principal object of this improvement is to prevent the separation of the sulphur from the bark or any other woody or carbonaceous matter that may be used as a substitute therefor, and to this end it consists in the addition to the compound of bark or other woody or carbonaceous matter, nitrate of soda, sulphur and chlorate of potash, of a suitable quantity of starch to prevent such separation. W. R. Thomas and Morgan Emanuel, Jr., of Catasauqua, Pa., are the inventors of this blasting compound.

THE BATTLE OF FREDERICKSBURG.

Our readers are doubtless familiar with the history of the conflict of the 14th of December, from the reports in the daily papers, and know, ere this reaches them, that another disaster has been visited upon us. Oh that we might write, instead, that victory had perched upon our helmets! The bitter almost insupportable shame of the "accident" is hightened by the stinging, though unintended, sarcasms conveyed through paragraphs in the daily journals. As, for instance, "the rebels are starving," "the rebels are ragged, without powder, ball, or caissons for their guns;" in short, that Falstaff's ragged regiment was the National Guard in comparison to them—the poor, wretched, deluded beings! What are such comments as these worth but to fasten deeper in our sides the thorn of disgrace and shame? Is the country really degenerate? Is the spirit which of old hurled back our foes from these shores and from these mountains and hills—which God never intended to be other than free—quenched and dead? No! a thousand times no! The blood that shed itself in vain, in fronting the quivering lines of certain death that flashed demoniacally before the eyes of those heroes who crossed the Rappahannock in open boats to dislodge the rebel sharpshooters, is the type of that fire which blazed of old against those who sought to overthrow the liberties we love. Of what use are the sacred dead who lie scattered through thousands of miles over this broad, and once fair land? Tell us who it is—for it is not the rank and file—who delay the consummation of our victories and the restoration of the peaceful arts ; what clue to this worse than Cretan labyrinth do the telegrams Fitz-John Porter forwarded to McClellan afford, as quoted by the New York *Tribune* of the 18th of December last? What a spectacle do they present of jealousy, hate and contemptible rivalry, through which means the nation was disgraced and a good soldier degraded in the last battle at Manassas.

Alas! for America when she fell from the hands of honest patriots into those of politicians ; when party strife and party weal or woe obtained the reins of power. Not Jehu when he drove the car of Phoebus, and threw the chariot of the sun out of its accustomed course, wreaked half such confusion upon the nether world as exists at this moment among us politically. Oh! if the dead who lie calmly sleeping in their graves upon the bleak hillsides could speak from their narrow houses, what reproaches would they utter against those whose folly, and want of fitness for their places, had brought them thus low. The sire, the man of mature age, youth, infancy even, in one common grave, the bosom of our loved country, sleep calmly forever. Is it strange then, in view of recent events, that we stand to-day with our currency depreciated, and our taxes threatening to overwhelm us, the wonder and contempt of the pettiest nations of the earth? We have not degenerated! In proof of this assertion see the records of the rank and file, how glorious it is! There is no necessity for pricking them into the fight at the point of the sword. The Eighty-eighth Pennsylvania built a pontoon bridge across the river, and would have crossed, or did cross to the enemy in spite of the dangers which threatened them ; what a glory should this be, to the old Keystone State ; and a little child ten years of age crossed in the first boat with the noble 400 of the Seventh Michigan, who first advanced on Fredericksburg, and beat his little note of defiance in the face of the foe. Such actions as these almost redeem the disgrace which has fallen upon us. Thirteen thousand five hundred of our bravest men are placed *hors-du-combat*, and for naught; what a holocaust! Menare thrown forward and face blazing batteries on which they are piled like fagotwood, and when the action is found useless, they retire and re-cross the river, as we are gravely told, without loss. What of those who never re-crossed the river, and who lie stark and stiff upon the whitened and frosty fields, an awful reproach to their leaders' want of prudence and consideration for them? With what heavy hearts we we read the now stale old repetition, that the rebels are starved and ragged and disheartened. Yes, so they may be, but they slay a whole town in a few hours and still present an unbroken front. There is no use in hiding or higgling over facts ; there is no earthly benefit to be derived from representing disasters as victories, or palming off defeats as creditable skirmishes. And those who telegraph such things from the battle-fields forget that this is an age in which truth, apart from them, far outstrips the lightning. We have never faltered in our allegiance to the Government, or been wanting in the most implicit faith in its ability, but when we view such "feats of arms" as the one which we record, not in anger but in grief, we cannot but feel anxious for the future. God grant that the turning point be not far distant!

VALUABLE RECEIPTS.

Water-proof Porous Cloth.—Several inquiries have been made of us, lately, respecting the mode of preparing cloth to render it water-proof and yet maintain its porosity. Close water-proof cloth fabrics, such as glazed oil-cloth, india-rubber, and gutta-percha cloth are completely water-proof, but do not permit perspiration and the exhaled gases from the skin to pass through them, because they are air-tight as well as water-tight. Persons who wear air-tight garments soon become faint, if they are undergoing severe exercise, such as that to which soldiers are exposed when on march. A porous water-proof cloth, therefore, is the best for outer garments during wet weather, for those whose duties or labor cause them to perspire freely. The best way for preparing such cloth is by the process adopted for the tunics of the French soldiers, during the Crimean war. It is as follows :—Take 2¼lbs. of alum and dissolve this in 10 gallons of boiling water ; then in a separate vessel dissolve the same quantity of sugar of lead in 10 gallons of water, and mix the two solutions. The cloth is now well handled in this liquid until every part of it is penetrated; then it is squeezed and dried in the air or in a warm apartment, then washed in cold water and dried again, when it is fit for use. If necessary, the cloth may be dipped in the liquid and dried twice before being washed. The liquor appears curdled, when the alum and lead solutions are mixed together. This is the result of double decomposition, the sulphate of lead which is an insoluble salt being formed. The sulphate of lead is taken up in the pores of the cloth, and it is unaffected by rains, or moisture, and yet it does not render the cloth air-tight. Such cloth is also partially non-inflammable. A solution of alum, itself, will render cloth, prepared as described, partially water-proof, but it is not so good as the sulphate of lead. Such cloth—cotton or woolen—sheds rain like the feathers on the back of a duck.

Composition for Leather.—In the receipt given on page 362 of the present volume of the Scientific American, there is an important typographical omission. The proper quantity of tallow is not given. The receipt should be as follows :—One pound of fresh tallow, one ounce of yellow bees-wax and one eighth of an ounce of shell-lac in powder. We have used this article and can vouch for its good quality.

The series of useful receipts will be continued in next volume.

Messrs. Jones and Quiggin, of Liverpool, will shortly launch a steamer of 250 tuns burthen, built of steel plates only $\frac{3}{16}$ths of an inch in thickness. The Liverpool *Journal of Commerce* states that she is intended for a "peculiar trade," and that she will steam 20 knots an hour. This "peculiar trade" is no doubt Confederate smuggling.

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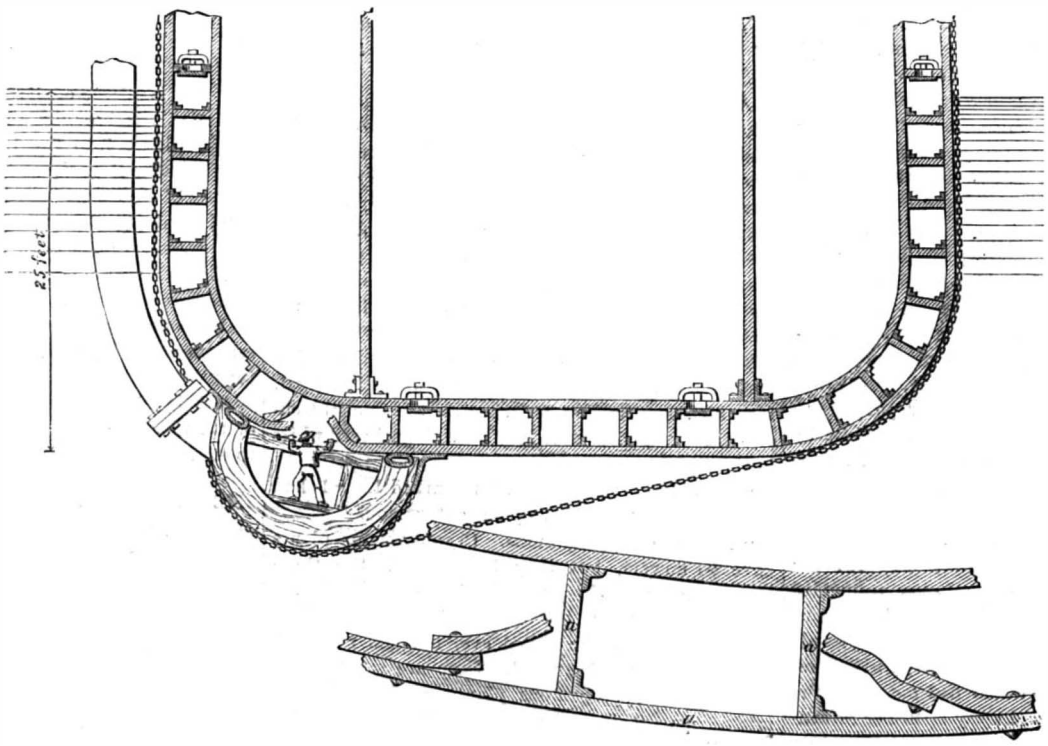
Repairing the "Great Eastern."

Through the courtesy of Messrs. Howland & Aspinwall and the personal attention of Capt. Walter Paton, of the *Great Eastern*, we are enabled to lay before our readers a full and succinct account of the disaster which befell this celebrated ship, and also details of the plans which were employed to repair her, together with the trials and delays which took place during the progress of this extraordinary feat of hydraulic and mechanical engineering. After the occurrence of the accident (with the history of which our readers are already familiar from a recent article in the SCIENTIFIC AMERICAN), a preliminary survey was held in order to estimate the precise locality and extent of the breakage. This was accomplished by divers, who went under the bottom of the *Great Eastern*, and, on returning, reported their observations. They announced that the plates upon the port side were badly damaged, and that the fracture extended a distance of some twelve or fifteen feet. Subsequent investigation disclosed the fact that these figures fell short of the actual injury by some feet.

The primary object of the survey being accomplished in ascertaining the nature of the injury, it only remained to invent some method by which it could be remedied. This was not imperatively necessary by any means, as from the peculiar construction of the ship, eminent engineers declared that, even with this enormous hole in her bottom, she might ride the sea with perfect safety. The anxiety and care of the officers, however, as well as the increased labor to the crew, attendant upon this huge tear in the ship's plating, decided the question; and the work was immediately prosecuted with vigor.

Owing to the huge dimensions of the *Great Eastern*, and the fact that there is not a dry dock in the world which will admit her or sustain her immense weight, it will be seen that to repair a damage of this nature, some twenty-five feet below the water-line, was an undertaking of no small magnitude. By referring to the section of the vessel, drawn for us by Capt. Paten, which we have had engraved (not however to scale), the precise locality of the fracture can be seen, as well also the construction of the vessel itself. The character of the damage, and the bearing it has upon the seaworthiness of the *Great Eastern*, will be understood by referring to our engraving. The hull is formed of two distinct vessels, as it were, one inside of the other. These skins are stayed to each other by a number of webs or partitions, that divide the vessel transversely into thirty-four spaces; they run the whole length from stem to stern. The webs are further crossed at right angles by thirteen separations which constitute a system of water-tight cells, each of which is entirely independent of the other, access being had to each cell through man-holes, provided with plates, that open into them. It must be borne in mind, also, that there are, inside of the ship proper, two upright iron bulkheads that divide the hull into three long rooms; now the man-hole plates previously mentioned communicate with each other from the upper series of cells in the ship's broadside down to the foot of the bulkhead beforementioned. There they stop. The arrangement on the other side is of course similar. The inner room has two man-hole plates on the inner skin, which allow access to the cellular divisions situated beneath it. These are connected through one another by the same plan as the others. In brief, the *Great Eastern* is a ship built up of a series of rectangular pipes, independent of each other other, yet capable of being connected together.



MODE OF REPAIRING THE "GREAT EASTERN."

Let us now return to the subject of the disaster. The fracture was entirely through the outer plating of the ship, extending over three of the longitudinal cells, and running fore-and-aft for a distance of 86 feet. To close up the sides by any other means than with new plates was simply impossible, and these had to be put on while the vessel was in the water at her anchorage. The stubborn broken plates with their ragged edges, afforded not the slightest hint that could be seized upon to accomplish the work short of much time and labor. Preliminary consultations resulted in deciding the authorities to adopt the expedient of a dam which should inclose the point of rupture on all sides, and which, by means of pumps, could be freed from water and rendered habitable while the operations were in progress.

It may be inserted here, not inaptly, that the idea of employing such a dam was suggested to Capt. Paton, some time since, by an accident which previously occurred to the *Great Eastern*, when going on to the "gridiron" at Milford Haven, England. The accident referred to was the springing-in of one of the plates of the ship's bottom, caused by coming in contact with a log upon which the vessel's weight came when taking her position. Capt. Paton mentioned his plan to the Messrs. Renwick Brothers, the well-known engineers of this city; it was approved of as practical by them, and they then devised the crib herewith described.

The coffer-dam was built of heavy oak timber, semi-circular in form, and planked outside four inches thick. It was ascertained that 32 tons of iron would be required to sink the scow, and it was forthwith partially submerged, while two chutes, hereafter mentioned, were affixed. Previously, however, two heavy chains had been attached to each side of it, in such a manner that the cable, fastened on to the larboard side of the dam, was carried under its bottom and rendered up on to the starboard side of the main deck, and *vice versa* in respect to the other cable. From the ends representing the bow and stern of the dam, there also ran large hawsers which kept it from going adrift in either of those directions. Power was then applied, and the wooden crib hove up against the ship's bottom. Around the parasitic structure were then carried other hawsers and cables, until it was firmly secured in place. Thus far, matters progressed favorably—the dam was in its place, but it was full of water. Two huge chutes, or funnels, which pierced the sub-aqueous box on one side, ten feet from the ends, ran up a short distance above the water-line, and furnished the means of reaching the fracture. The edges, or gunwale of the dam, must, as will be apparent, be made water-tight, else the pumping might be continued indefinitely, without any result. This it was proposed to accomplish by means of some elastic material; hence india-rubber, flock mattress, or substances of a like nature, were suggested for the purpose, but not being available, a plan of the Messrs. Renwick Brothers was put in force.

It occurred to the Brothers Renwick that a water-hose would be just the thing. After the details of its construction, for which we have no room, had been worked up, it was soon applied, and fulfilled all the expectations formed of it. No sooner was the means discovered for obviating one trouble, however, than another appeared. This latter vexation was caused by the difficulty of overcoming the tendency which the hose had to draw in under the compartment. In order to secure it, strips of canvas were attached to one of two battens, which armed the gunwale dam; these were carried under and over the hose at intervals, in such a manner that the latter lay in the bight of the former; the flying end was then fixed to the batten again. Upon the outside of the case, or dam, a lappet of Brussels carpet was secured, which the water kept up against the *Great Eastern's* bottom, aiding materially in keeping the sea out; weeds were also thrown into whatever crevices might remain, and the projectors of this ingenious method were rewarded for all their time and trouble by its complete success. To all the unequal surfaces the water-hose opposed its soft and elastic surface, filling up cavities which could not be effectually closed by any other means. The pumps were again tried, and the crib was pumped dry. No sooner was this consummation attained than Capt. Paton descended the chute to the scene of the fracture. Here an extraordinary sight was presented. The vessel was covered with long weeds, and from the cavity in the plates there rushed a waterfall on a small scale; this was perplexing, and was supposed to arise from the fact of some of the valves which communicated with the ship's bottom being open. It was found to proceed from other causes, which were soon remedied. Some water yet remained at the bottom of the box, through which Captain Paton, followed by Peter Falcon, an experienced diver, forced his way, finally emerging at daylight through the other chute. His arrival afforded the best possible assurance of safety to the mechanics who, not unreasonably, hesitated to ventured into such an "uncanny" affair. The moral support given to the cause by Capt. Paton's conduct re-assured the doubters, and they prepared to fall in with vigor. It might be expected that here the Fates adverse to this scheme would have been appeased with their former interference; but such is not the case. During the last month, on the occurrence of the violent snow-storm, the great ship dragged her anchors, and parted one of the cables which kept the dam in place. This line immediately, as a matter of course, got about the pump-shaft, which was at that time operated in the sea, and tore it away from its connection, filling the whole dam full again. The pump was then rigged so as to prevent the occurrence of a like disaster.

Supposing free access to be had to the fissure, let us examine the nature and character of it. It extended for a distance of 86 feet in length, by 9 feet 6 inches at the widest part, narrowing to a point at either end, and was a ghastly wound in the ferruginous cuticle of the monstrous vessel, which, while it did not impair the sea-worthiness of the ship, was of sufficient importance to warrant attention. Three of the cells were broken into, and two of the longitudinal webs upset and sprung out of place for a distance of ten feet. As it was impossible to add anything to these last-named parts, a plan was put in force whereby the wounded and disunited plates were

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made one and indivisible again. The diagram will convey an accurate idea of this method. The new plates, *a*, are laid athwart-ship over the fissure, and fastened with hot rivets to the old ones; braces are also annexed, which represent the vertical divisions of the cells. The plates in the vessel's bottom are seven-eighths of an inch thick, but the patch is only five-eighths; it is, however, of the best charcoal-boiler iron, and is deemed equivalent in strength to the original structure. Great delay has occurred in getting the new plates in place, for the reason that they could not be supplied by the manufacturers as fast as they were wanted. This trouble has been remedied, like all the others; and we have the satisfaction of announcing, from a personal inspection of the job, that it is completed in a substantial and workmanlike manner. The inside of the dam is very comfortable, indeed, and the workmen, we are assured, made no complaints in this respect. They were at work continually, and inasmuch as their labors would have been materially retarded by visitors, no one beside the workmen, not even the ship's officers, were allowed to descend the chute.

The ingenuity and perseverance evinced in adopting this novel apparatus, and making it work practically, is something remarkable; and its projectors, Capt. Paton and the Renwick Brothers, have reason to feel satisfied with it.

Since the above article was written, we have visited the *Great Eastern*, and descended into the scow just described. We went through the whole affair without any protection to our garments, and came out unharmed by wet or grease. We must, however—compelled by the inexorable laws of column-rules—omit further details. On this occasion, which was one devised to give the press and the reporting engineers an opportunity of satisfying themselves by occular evidence that the ship was all sound again, Capt. Paton entertained his guests in a hearty and hospitable manner, placing before them on his board the finest viands and wines. At the conclusion of the festivities, a gentleman having proposed the health of Queen Victoria, Capt. Paton responded modestly, and returned, "The President." Various other toasts were given, and the guests dispersed, highly pleased with their cordial, truly British reception. As the steamer which had conveyed the visitors to the vessel steamed away upon her return-trip to the city, the band of the ship, stationed on the wheelhouse, delicately complimented the disappearing boat with national airs, to which, also, the crew added force, by giving lusty cheers for the Union. Long after the responses which followed these demonstrations had died away in echoes, "the martial strains of the inspiring brass" sent forth "Hail Columbia" and "Yankee Doodle" with a vigor that excited the most lively enthusiasm for not only the compliment which was conveyed, but also the hospitable entertainer, Capt. Paton.

A series of resolutions highly complimentary to Capt. Paton and the Messrs. Renwick Brothers, were passed by the guests on their return to the city, which we are compelled to omit.

The "Alabama."

The Confederate pirate, the *Alabama*, seems to be re-enacting the *rôle* of the *Sumter*. She was recently surprised at the island of Martinique by the United States steamer *San Jacinto;* the latter being obliged to conform to the port rules and lie outside of the harbor, the *Alabama*, of course, escaped in the night. We predict that Semmes will be caught yet: "its a a long lane that has no turning," the old proverb says, and he will prove no exception to it. It would be a good idea, when the corsair is taken, to try the captain of her by a jury composed of the commanders of the several ships he has destroyed. "A long rope and a short shrift" would doubtless be a popular verdict.

A MICROSCOPIC vertebrate would certainly be a curiosity in zoology. Mr. G. C. Wallich figures and describes, in the October number of the *Magazine of Natural History*, a perfect lower jaw with fully developed teeth, found by him in mud dredged up at St. Helena. This jaw is only the hundredth of an inch in length, which in proportion would make the animal to which it was attached not longer probably than one-twentieth of an inch.

OUR SPECIAL CORRESPONDENCE.

The man that knows the names of 100,000 *plants—The folly of scraping trees or of girdling them with troughs to keep off certain worms—The utility of picking up butterflies—Plants that grow in the mouths of fever patients—Animals that live in nitric acid.*

MESSRS. EDITORS:—I have made a notable discovery. After sweeping the whole country from New England to Texas at your expense in search of subjects to interest the readers of the SCIENTIFIC AMERICAN, I have found that the best place to look for these subjects is in the varied and multitudinous life of this great city. This is the center of intellectual activity of the whole country. In an hour's walk along our flagstones a man may meet more skill, novelty, enterprise, thought, intelligence and emotion than he can in days of travel across the solitary prairies of the West or through the interminable wilderness of pine forests at the South. As an easy illustration of this truth let me give you an account of my voyage across the East River to visit the city of Brooklyn, which is essentially a part of New York.

A few evenings since a small party of gentlemen accepted an invitation from Colonel Pike to examine his specimens of natural history. After looking at a few cuttings through the microscope, we addressed ourselves to the pleasing task of turning over the leaves of a ponderous portfolio which was filled with specimens of ferns. The leaf of the fern is peculiarly adapted to preservation, as its beauty consists in its form, and certainly there are no forms in all the works of nature that are more more beautiful. Mr. Pike has between two and three hundred species, among them every species that grows in Portugal, for which country he was for a time the Consul General. He remarked that they were all gathered while in the seed.

"They have seeds then?" remarked I. "I had an impression that ferns were cryptogamous."

"They are cryptogamous. Cryptogamous plants have no flowers, but they have seeds. See these little bunches all along the edges of the leaf. These are groups of seeds, the individual seeds themselves are not visible to the naked eye, but under the microscope they are beautiful. Here are some of my drawings of cryptogamous plants, made under the microscope. This is the green that grows on cellar walls."

"How do the plants of these low orders propagate, Mr. Pike?"

"In different ways. This one now is a single filament as you see. This folds right over upon itself, when the endochrome in one fold approaches that in the other till the two touch, when one is made fruitful by the other."

"It may be called the lowest form of marriage."

The colonel continued: "I am very frequently asked what is the use of this study of natural history. Some of our very intelligent citizens say to me, 'How are you going to make anything out of this?—what good does it do to catch butterflies?' I saw one of the wealthiest men in Brooklyn at work on the trees in front of his house. He had had them all scraped and whitewashed at an expense of $80. Says I, 'Mr. Hunt what are you doing that for?' 'To keep off the worms,' he said. 'That is no use,' I remarked. 'Oh,' said he, 'I think it is.' Well now, the insect was a *geometra;* the butterfly lays its eggs on the ends of the branches, and it is almost impossible to kill the eggs. The strongest northwest winds have no effect on them; I have seen them in Maine, and it is difficult to crush them with your nail. When they hatch in the spring, the young worm eats off the tender leaves. You can judge what good the scraping of the trunk will do. I went by, some months afterward, and Mr. Hunt was in front of his house looking up at his trees which had not a leaf on them, and I remarked, 'Your trees are looking finely Mr. H.; the scraping was more profitable than hunting butterflies.'"

"From the name of that worm, the *geometra*, or earthmeasurer, I suppose it is what boys call an inch-worm—one of those that travel by drawing up its hind legs so as to fold its body into the form of an inverted U, and then pushing forward its fore legs to straighten itself?"

"Yes, all worms that travel in that manner are called *geometra*."

"Have you ever, colonel, examined any of the plants that grow in our bodies."

"Oh, yes, Dr. Jones gave me some matter from the mouth of one of his fever patients, and on placing it under the microscope, I found that it was a perfect specimen of *conferva*. There is a large variety of these plants you know. By the way I must show you some of the *acari* in my nitrate of silver bath. I have some set away in a vial and I will go and get it. There, this scum on the top you see; let us take out a little. There, I believe I have some on the point of this needle; now give me one of the glass slides. Now, Mr. Johnson, see if you can find him."

"Here he is, but he is dead."

"What did you take him out with?" asks the professor.

"With a needle."

"That would kill him, of course. Let me see him, for when Crosse first published his account of finding *acari* in nitric acid, I supposed of course it was a mistake, and have always supposed so. That is an animal sure enough, but he is dead. Will you give me a little salt, Mr. Pike, I should like to be certain that this is nitrate of silver."

The salt is brought, the professor tastes it and drops a little into the liquid on the slide, a white precipitate is formed, and the liquid is pronounced nitrate of silver.

"I would like to see some of those alive," remarks the professor, "for I consider the fact of animals actually living in nitric acid or nitrate of silver—substances which are so destructive to all known animal organisms—one of the most remarkable discoveries in physiology that has been made in this century."

As it is getting late, the colonel offers to take some of the liquid to the professor's office and allow him to examine the animals at leisure. B.

THE NEW YORK SANITARY ASSOCIATION---THE VENTILATION OF BUILDINGS.

At a recent meeting of the New York Sanitary Association held at Cooper Institute, Mr. J. Hyslop delivered a brief lecture on ventilation, in which he explained McKinnell's concentric double-current ventilator, with a model. He said that statistics afforded abundant evidence to prove that workshops and dwellings which were not well ventilated were defective in one of the first conditions requisite to health. Statistics had recently been collected in Lancashire, Manchester, Boston and other cotton districts, by which it appeared that among those in the districts which had suffered most from the cotton famine there were fewer deaths than among those who had been in constant employment. Reliable data afforded evidence that tailors, shoemakers, clerks and printers engaged at night-work suffered greatly from being confined in rooms that were generally ill-ventilated. The ventilator consists of a double pipe which is placed on the top of a building, and communicates with the apartments below. The warm foul air passes up through the central tube of the ventilator, and the fresh cold air is admitted into the annular space around the central tube; it is then deflected by a flange while passing down and diffused over the whole of the apartment below. The exit tube is longer than the passage for the cold air, and the ventilator acts like an inverted syphon, upon the expansive principle. It differs from the Ruttan system of ventilation inasmuch as the warm air passes out above, and the fresh air also comes in from above, whereas, by the Ruttan system, the warm air is carried downwards. This new system is capable of easy application to any building, and it has been applied to several here and many in England where it originated and where of late years so much attention has been paid to sanitary subjects. Dr. Griscom and many others who were present at the meeting of the Sanitary Association expressed themselves highly gratified with the lecture, as it was thoroughly practical; the model used having demonstrated the statements of the lecturer with regard to its successful operation.

M. T. P. Desmartir states in the *Comptes Rendus* that an ointment made of equal parts of lard and the extract of logwood "cures hospital gangrene like magic." It also removes fetid odors from the sores of wounds.

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Extensive Manufacture of Army Cloth.

The Philadelphia *Ledger* states that several cotton and carpet mills in and near the city of Philadelphia have been converted into establishments for the manufacture of blankets and kerseys, and they are now doing an enormous business.

One Philadelphia firm alone—Benjamin Bullock & Sons—have in operation, running day and night, twelve mills, all within ten or twelve miles of the city proper; in these, blankets and sky blue and dark blue cloth are made, and upon the extensive operations of the several establishments about 8,000 persons are dependent for their daily bread. Many of the mills, as before stated, had been used for other purposes before the rebellion commenced, but Messrs. Bullock & Sons have of late turned their attention to the erection of works especially designed for the manufacture of cloth. Machinery of an improved order has been set up, and at present one of the mills and its fixtures, located near the Conshohocken station, on the Norristown Railroad, is a model of its kind, alike creditable to the firm and the mechanics employed in its construction. A one-story stone building, 285 feet by 85, contains ten full sets of machinery for the making of cloth. Attached to this main building are the dye-houses, wool-house, fulling room, engine room, and building containing the gas apparatus. Gas made from the crude petroleum is introduced not only in the factory but into the dwelling houses in the neighborhood, belonging to the firm and occupied by the operatives, 200 of whom are employed in this mill. A village, peopled by those interested in the work, is springing up around the mill, and the firm has erected a neat church in the midst of the settlement.

The ten sets of machines are driven by an engine of 100-horse power is also derived from the stream upon which the mill is located. The machinery used is of the most delicate and intricate construction, and the process of manufacturing cloth from the raw wool is a curious one, and well worth a visit to witness. The raw American wool, than which there is none better for the purpose in the world, first requires to be sorted, the burrs and other foreign substances removed, and then it is ready for "scouring." In order to fit the wool to take the dye, all the grease must be removed, and this process is the scouring. The room in which this is done is decidedly damp, as the use of steam enters largely into the process. The wool thus sorted and scoured is then ready for the dye-vats, where a day is sufficient to give the required color; after which the wool is taken to the picking and carding room, where it is separated and prepared for the machine, known as the "Spinning Jenny." The looms next receive the bobbins of spun woolen yarn, which is woven into coarse-looking stuff eighty inches in width. After this it is carried to the "fulling" machine where, under the action of a vapor bath, the eighty inches are contracted to fifty-five inches, with a corresponding filling-up of the sieve-like interstices. This process also gives what the trade call the "felt," and the cloth now appears to be about three or four times the thickness it had been when in the weaving machine. After this the cloth is washed and dried on stenters, and is fit for the napping machines; then shorn and pressed. The cloth is folded with sheets of stout paper between each fold, and is then subject to the action of a powerful hydraulic press containing hot plates. Leaving this, the cloth has the requisite gloss and finish, and is ready for packing and market.

The materials used in the manufacture of the cloth require about eight weeks of manipulation before they appear as cloth, and for this it will be understood that a large stock must always be on hand in all stages of manufacture. Two hundred hands working night and day (half in the day and half in the night) turn out from 8,000 to 9,000 yards in each week.

From the operations of this one mill it will be readily seen that the manufacture of cloth has come to be an important feature in the list of Philadelphia enterprises. Several millions of dollars are invested as capital, and hundreds of thousands of persons, directly and indirectly, are interested in wages and daily subsistence.

The losses of petroleum at Oil Creek, Pa., by recent freshets, are valued at $500,000.

The Manufacture of American Iron Plates.

The iron plates which are employed in the construction of the turrets and the hulls of the *Monitor* class of vessels are very broad and one inch in thickness. The Baltimore *American* states that most of these are manufactured by Messrs. Abbott & Son, in the eastern district of Baltimore. Their rolling mill is a very extensive establishment, and the machinery is driven by steam power. In the manufacture of these plates, Maryland puddled iron is used, and is first piled in faggots weighing about a tun each. These are raised to a white heat, and each then rolled into a plate forty inches wide, nine feet long and one inch thick, weighing about 1,750 lbs. After being cooled it is beaten flat with great wooden mallets. The edges are trimmed with huge shears, and when finished the plate weighs about 1,300 lbs. It takes twenty of these nine-foot plates, varying in width from forty to forty-three inches, to go around a 21-foot turret. Plates four feet square, for the armor of the hulls of vessels, are also manufactured in the same establishment.

Boiler Explosion.

A locomotive attached to a freight train on the Hudson River Railroad burst its boiler on the 10th ult., killing the engineer and fireman. The *debris* were scattered over the track; a train which was coming in the opposite direction run into this rubbish before it could be checked, and was partly precipitated down an embankment. The disabled locomotive was drawn back to the depot where an examination of it was made, which revealed the fact that there was, apparently, a sufficiency of water at the time of the disaster; the flues were in good condition, and the general appearance of the boiler was satisfactory. The deceased engineer, Mr. Edward Harris, was a faithful man in the discharge of his duties. This seems to be one of those mysterious circumstances which frequently occur in connection with steam boilers. We hope subsequent examination will reveal some cause for this disaster.

Use of Tea and Coffee.

One of the most remarkable facts in the diet of mankind is the enormous consumption of tea and coffee. The slightly stimulating and narcotic properties of these substances do not seem sufficient to account for the fact that upwards of 2,000,000,000 of pounds of these articles are annually comsumed by the inhabitants of the world. It has, however, been found that they contain an active principle, which, though small in quantity, is yet supposed to form an important part in the human economy. The principle is called *theine* in tea, and *caffeine* in coffee, which are identical in composition; and, what is very remarkable, this same principle has been discovered in the Paraguay tea, a species of holly used for infusion by the natives of South America; and a principle very similar, called *theobromine*, is found in the nuts from which cocoa and chocolate are prepared. According to Liebig, there is found in the blood a principle called by him *taurine*, resulting from the destruction of the tissues of the body, and having a composition so closely resembling *theine*, that the one may easily be converted into the other. *Taurine* performs an important office in the economy of respiration; and Liebig suggests that the introduction of *theine* into the system prevents the destruction of the tissues for the purpose of forming *taurine*, and thus, though not nutritive itself, it becomes indirectly nutritious to the body in saving its tissues from destruction.

Absorbing Power of the Human Skin.

Dr. Murray Thomson, lecturer on chemistry at the Edinburgh School of Medicine, relates some experiments which he tried on his own person to ascertain the truth of the statements made as to the curative power of mineral water baths, depending on the absorption by the skin of certain salts and other substances which they hold in solution; and further, to ascertain whether certain substances applied in the form of ointments, &c., pass through the skin and reach the blood before they produce any beneficial effect. His conclusions are:—"Not only has absorption by the skin been greatly exaggerated, but in the case of substances in aqueous solution, it seems to be the exception, not the rule, for absorption to take place; and, in the case of ointments, etc., some substances so applied seem to be absorbed and others not." Mercury is absorbed by the skin, but Dr. Thomson's experiments have led him to conclude that the iodide of potassium, which is in very common use by doctors, is not absorbed, and its applications may be abandoned.

Steam Fire-engines Abroad.

We take from the London *Engineer*, of November 28th, the following account:—

At a trial of steam fire-engines lately had in London, England, one built by Mr. Lee, of the firm of Lee & Larned, of this city, played with an English steamer constructed by Messrs. Merriweather & Son. This latter engine weighed, it is understood, 3½ tuns, empty. It has one 9½-inch steam cylinder, by 9½-inch stroke. Mr. Lee's engine weighed rather less than this, and has two steam cylinders of the same dimensions working two water cylinders of 5½-inch bore. The Merriweather engine being fired, with water at 44°, the index of the steam gage moved in 7½ minutes. At 9 minutes 50 seconds the engine began playing, with a steam pressure of 50 lbs., through a 1¼-inch nozzle; with 120 lbs. steam and 80 lbs. water pressure, working through a 1⅜-inch nozzle, the engine threw to a distance of 150 feet vertically. A 1½-inch jet was thrown 150 feet high. In trying Mr. Lee's engine, with the water at the same initial temperature, the steam started in 6½ minutes, and the engine began to work with 20 lbs. pressure in 9 minutes. With a 1¼-inch nozzle a stream was thrown to a hight of 165 feet; with a 1½-inch nozzle, and a pressure of 140 lbs. in the boiler and air-chamber, a stream was thrown vertically 160 feet; a 1⅜-inch stream was also thrown to the same hight. This engine gave a good jet, but the hose having burst soon after, the judges were prevented from taking any accurate observations. A great amount of fire (cinders) was thrown out of the chimney to a hight of 60 feet and the speed of the pistons was very great.

[When the fire flies Mr. Lee is in his glory.—Eds.

A Double-screw Steamship.

A steamship of 400 tuns capacity, length 160 feet, breadth 22½ feet, and propelled with two screws and engines of 120 horse power, lately made a trial trip down the Thames river, and around part of the English coast. Her speed was 14.16 knots per hour. The two screws, with an engine for each, work independently. An experiment was made with both engines, going ahead at full speed, and the helm hard over, when the first circle was made in 3 minutes 14 seconds; the second in 3 minutes 13 seconds; and the third in 3 minutes 16 seconds; the diameter of the circles being about three lengths of the ship, and lessening each time. In the second experiment one engine and screw worked ahead, with the other going astern, and one circle was made in 3 minutes 39 seconds, and another in 3 minutes 49 seconds. In making these circles the action of the ship's hull was extraordinary, the central part being stationary, and both ends moving round equally; the circle was made as if on a pivot from the ship's middle section.

Destruction of Oil Boats.

Artificial freshets are employed to float the flat boats laden with petroleum down Oil Creek to the Alleghany river. The water is collected at different points in large ponds, and at a given time the sluices are opened, and through the freshet thus produced immense quantities of oil are floated down, which, but for this contrivance, could not, without great expense, be got to market. The stream being very narrow, and the water necessarily shallow, it requires great care to navigate it with safety; and at nearly every freshet, large quantities of oil are lost. We learn from the Pittsburgh *Chronicle*, that during one of these freshets, two weeks ago, petroleum to the value of $100,000 was lost. When the first rush of water came, twenty boats broke loose, and these swept a large number of others from their moorings, and fifty-six were wrecked. About 10,000 barrels were lost and all the cargoes that were in bulk.

By reports from all the wine-growing districts of France, it is ascertained that the cost for renewing the timber supports of the vines amounts to $25,000,000 annually. From this we obtain an idea of the vast extent of the French wine trade.

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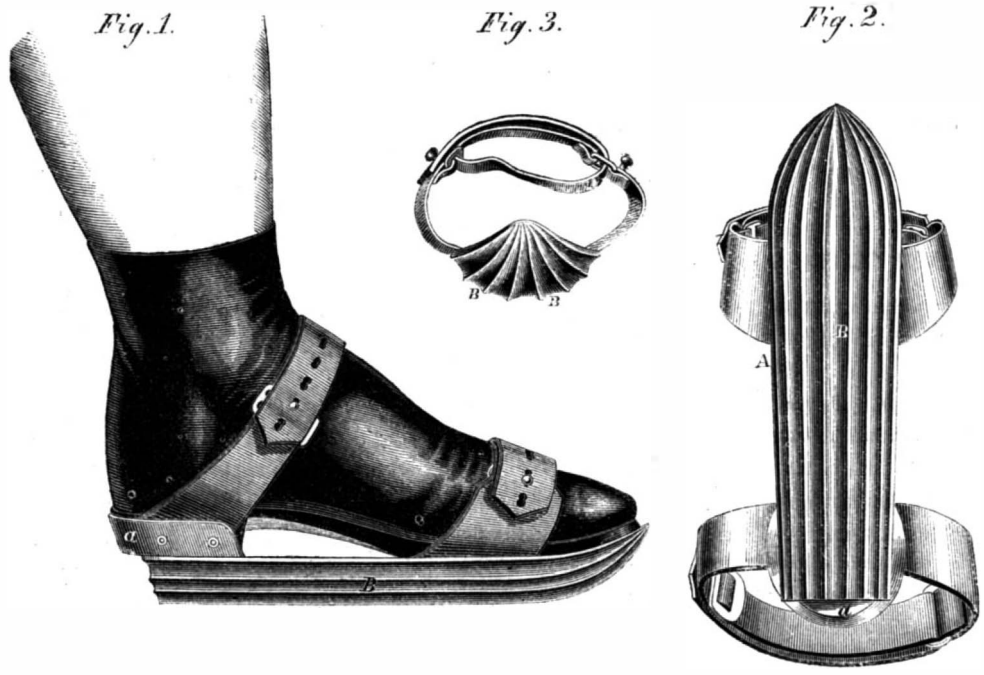
An Improved Skate.

The ingenuity of our inventors seems to have branched out in every direction and explored every avenue in search of some neat device which would combine all the desirable qualities of a skate in one. In this gyrating age we have had all kinds of instruments of this class illustrated in these columns, and we herewith add still another to the list, entirely different in its construction from any before illustrated. This skate is designed for those persons who have neglected their skating education, and whose muscles are, in consequence, incapable of the strain which the sport subjects them to. It consists, as will be seen by referring to our engraving, of a steel runner, A, whose width is equal to that of an ordinary human foot. This is grooved from end to end with a number of sharp gutters, B, so that it matters not in what direction the foot or body is inclined toward the ice, a firm hold is always obtained laterally, and the performer, much to his own satisfaction, maintains his equilibrium and personal dignity uncompromised. A brass band, *a*, at the heel prevents the foot from slipping backward, and straps of a peculiar construction, which the illustration makes perfectly intelligible, retain the whole in position. Fig. 1 represents a view of the skate attached to the foot, and Figs. 2 and 3 show, respectively, the formation of the several grooves, B, and also an end view of the runner and straps.



DUTTON'S SHELL-GROOVE SKATE.

This skate is the invention of Mr. Wm. H. Dutton, of Utica, N. Y., and the patent for it was procured through the Scientific American Patent Agency, April 15, 1862. These skates are on sale in this city at Tiffany's extensive jewelry establishment, 550 Broadway, this city ; and further information can be obtained by addressing the inventor as above

Postage-stamp Canceller.

A correspondent having seen a notice in our paper that a new postage-stamp canceller was required, has sent us a sample of a plan proposed by him to effect this object ; it consists in perforating the stamp across its middle, and attaching it to the letter by its lower half alone, the upper part not being gummed. When the clerk at the office receives the letter he tears off the upper half of the post mark, and leaves the lower part on to show that the matter has been pre-paid. Our correspondent thinks that this will effectually prevent any illegitimate use of the stamp. We think this plan a very good one if it was not for one or two objections which might prove hypothetical in practice, and these are, that the loose end of the stamp might be detached prematurely ; secondly, that if only one half of the stamp is gummed, the present machinery for that purpose will be useless, and new would have to be obtained.

We have also received another plan for the same purpose, which consists of attaching a double stamp to the letter, one of them gummed fast in the ordinary way, and the other projecting on one side like the leaf of a book. This the inventor proposes to have torn off by the department and retained, as we understand him, though how it will provide any facilities for detecting fraud is more than we can discover ; on the contrary, it offers a premium for it. Rogues are not apt to lose a chance to steal, and what is to prevent any one from tearing off the stamp and appropriating it to his own use ? The above methods are all impracticable.

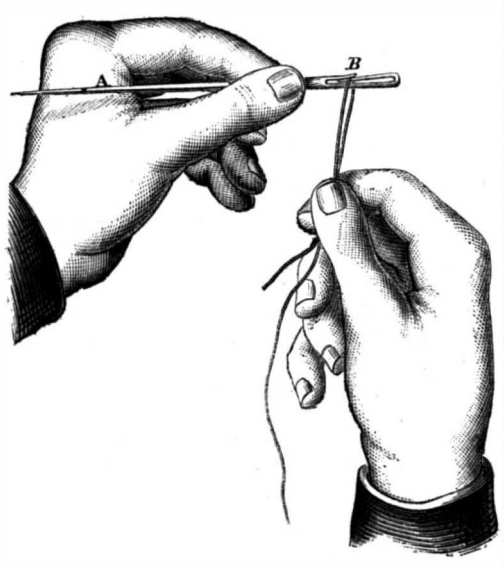
There is no necessity for perforating the stamp, as the sharp edge of the letter will readily divide it. The uncouth appearance of these methods is also against them. What is required is a punch, or its equivalent ; post office clerks are used to that routine, and to introduce any other kind of manual labor would cause a revolution in the operations at the mailing office, which would result in much delay, and consequently be a nuisance. Some simple device must be adopted ; who will be the first to introduce it ?

Lighting Conductors.

A paper on lighting conductors was lately read before the Academy of Sciences in Paris by Mr. Callaud, in which he stated that many lighting conductors are made in France of thin brass wires twisted together. Their power of conduction is about twenty-five per cent. superior to iron, but they are more fusible than iron, and in this respect are defective. Copper wire, he stated, afforded the best and cheapest material for electric conductors, as it was—next to silver and gold—the best conducting metal. A conductor made of several small copper wires twisted together, he considered, was about the best and most convenient which could be used.

COOPER'S PATENT NEEDLE.

The nature of this improvement in sewing needles consists in constructing the eye by turning over the



end and forming what is called a lap joint, through which the thread may be drawn without the necessity of inserting the end of it in the ordinary way. The accompanying engraving shows the manner in which the needle is made.

A is the needle ; B is the lap joint, so that by holding the former between the thumb and finger, laying the thread over and bringing the two ends together in the other hand, drawing it down to eht joint, B, depressing that portion of the eye, under the lap, admits the thread into A.

The advantages derived from this improvement are various, among which are that the blind can use them as readily as those who can see ; that worsted needles, generally so tedious to thread, are readily put through that operation ; and also, that surgeons will find these needles convenient, as they will readily pass through the flesh, obviating any delay formerly incurred by threading.

This useful invention was patented Jan. 22, 1861, by George Cooper, of Thompsonville, Conn., to whom all letters must be addressed.

Warming Tents.

Mr. E. H. Beebe, of Galena, Ill., sends us a sketch of a plan for warming hospital tents for sick soldiers. It is merely a brick furnace constructed underneath the ground floor, and roofed with T-rails ; three of them, laid side by side, are used and the interstices between filled in with clay. The heat is conveyed into seven tents by a flue 100 feet in length, supplied at the end remote from the fire with a wooden chimney. Dr. E. D. Kittoe, of the Forty-fifth Illinois Volunteers, is the originator of this subterranean furnace, and says that it is a very useful thing. The iron radiator at the top is a good feature, as it equalizes the temperature and retains the heat for a long time. We presume it must be erected in the neighborood of some rebel railroad, so that the supply of iron may be drawn from that source.

Iron-clad Men.

It has been suggested to us, in view of the improvements which are daily carried out in iron-clad ships and batteries, that the same principle might be applied to their crews, or to infantry in the field. Some steps have already been made in this direction, and life-preserving vests have been sold, we believe, in great numbers ; why, then, can we not sheath the human body so that it will be perfectly protected against rifle balls at least, and yet, at the same time, preserve its elasticity and activity unimpaired ? The force of a bullet, stopped in mid career, would doubtless make the iron or steel-clad recipient wink, if it did not entirely destroy his center of gravity, but we think most of all our sharpshooters would gladly exchange the possibility of being stunned or even stricken senseless for a time, for the certainty of being killed outright without such protection. The ancient men-at-arms and Knight Templars wore suits of mail, but they weighed down both horse and rider and had to be abandoned. Let some ingenious person invent a complete personal protection, and he will assuredly reap his reward.

PUT UP YOUR OLD RAGS—NO MORE LINT WANTED.—The Secretary of the U. S. Sanitary Commission at Washington writes to the Superintendent of the Philadelphia depository, on October 7th as follows :—"Lint, bandages and old linen have reached us in such enormous quantities that we have been obliged to hire a storeroom for no other purpose than to store away the surplus 500 barrels. Please, therefore, discourage their further manufacture in your district, and endeavor to turn the energies of the people toward the making of under-clothes and the knitting of socks instead."

THE MONTAUK.—The Ericsson battery *Montauk* made a trial trip from the Navy Yard on the 16th ult., which was said to be a perfect success. We presume it was, but not being present on the occasion, we are unable to furnish our readers with any reliable report.

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VOL. VII. NO. 26.....[NEW SERIES.]....*Eighteenth Year.*

NEW YORK, SATURDAY, DECEMBER 27, 1862.

TO OUR FRIENDS.

NOW IS THE TIME TO FORM CLUBS.

With the present number another volume of this journal closes. We appeal to its friends in all sections of the country where mail facilities exist to endeavor to form clubs for the coming year. We feel justified in asserting that no other journal in this country furnishes the same amount of useful reading, and especially at the extraordinarily low price at which it is furnished. The present high price of paper has rendered it necessary that we should somewhat increase the subscription price of the SCIENTIFIC AMERICAN, but by availing themselves of our clubbing rates persons may obtain the journal on very reasonable terms even now. We are obliged to pay more than double the price we did one year ago for the same quality of white paper that the SCIENTIFIC AMERICAN is printed on, while the subscription price to clubs is only a fraction more than formerly.

The long winter evening must be relieved of its dullness, and we must keep reading and thinking, and thus be prepared to overcome temporary difficulties and open new channels of wealth and prosperity. Friends, send in your clubs; at least renew your own subscriptions promptly.

TO OUR SUBSCRIBERS.

The publishers of no other paper in this country have maintained such a friendly relationship with their subscribers, as those of the SCIENTIFIC AMERICAN. Our suggestions and requests have uniformly met with a kindly and hearty response, and we have never forgotten that "one good turn deserves another." The subscription term of several thousands of our readers will expire with this number, and we urgently solicit a renewal of your patronage. On a previous occasion we presented the reasons which compelled us to raise the rate of subscription. We would have preferred to have continued our paper at the former price, but this is impossible under the circumstances. We hope none of our old subscribers will fall off on this account, as our course has been dictated by events over which we had no control. And yet with all the increased price of the SCIENTIFIC AMERICAN, it is still "the cheapest and best mechanics' paper in the world." Taking into consideration its size, the fine quality of its paper, its beautiful illustrations, the peculiarity of its information, and the immense amount of thought and labor bestowed upon it, unquestionably it is the cheapest weekly paper on this continent.

THE PAST AND PRESENT.

This number closes another volume and another year of the SCIENTIFIC AMERICAN. The past year of its existence has been checquered beyond all precedent. The greatest civil war on record has been raging in our country, and the painfully conflicting events of its outgrowth have affected deeply all classes of our people. Fathers, husbands and brothers have perished in tens of thousands from the bullet and the bayonet, the malaria of the swamp and the exhausting toil of terrible marches. Tens of thousands are also now pining in hospitals from fever and wounds; and tens of thousands of the stalwart and brave have come back from the conflict maimed objects for life. Our land is clothed with mourning; our tears are for the dead; our sympathies for the suffering and bereaved living. And with these dreadful realities of civil war, great changes and vicissitudes in social and business relations have been experienced. Necessarily increased taxation, a depreciated currency and a great advance in the cost of many materials and manufactures have completely changed the condition of both the general and common affairs of life. There is scarcely a family in the land that has not had cause for grief; and yet with all our afflictions, as a people, Providence has been also kind. Never before have our harvest-fields yielded in greater profusion, and we have been enabled to feed the starving thousands of England's toil-worn operatives—a million of whom are said to be subsisting on charity.

In consideration of all our national, commercial and financial troubles, the progress of invention has not been unsatisfactory. Up to the present date, from a similar period last year 3,220 patents have been issued—three hundred more than in the same space last year. Many persons suppose that the inventive genius of the country has been exclusively devoted to implements and vessels of war, but this is not the case. Many very useful improvements have been made in almost every department of art, and a large number of these have been illustrated in our columns. They are various in their nature and character, but the greatest number relate to agriculture, and this is very gratifying, as husbandry is the mother of all the other arts.

We close this year under impending circumstances upon the issue of which are suspended the hopes and fears of millions. Public affairs may now look dark and gloomy, but let us not despond. This is not the time for despair, but determined and patient effort. We know not what a day or a week or a year may bring forth; therefore let us hope for the best, and labor to secure success. It is to our virtuous and industrious yeomanry and mechanics that we look for the salvation of our country.

"A voice speaks within us we cannot control,
Which tells of a time when these ills shall depart,
When knowlege shall win its bright way to the soul,
And virtue, like music, shall soften each heart."

THE MERITS OF VARIOUS KINDS OF ENGINES.

Before employing steam power as a motor, the kind of work it is desired to perform as well as the quality and quantity of it should be taken into account. If it is proposed to erect a flour mill, we must project an engine which will transmit a regular and steady motion without cessation; or, in the case of a mill for rolling iron, the automatic apparatus which governs the engine must act instantaneously, so as to prevent the machinery from running away with itself when the strain is removed.

Prejudices in favor of certain patterns of engines will always exist to a greater or less extent. One person may prefer a beam engine, another an oscillator, and another a horizontal one. We propose to show, briefly, the merits of each plan, and then individuals can exercise their own predilections in favor of this or that particular one.

The horizontal cylinder engine has always been in favor with a large class of the manufacturing community from its lessened first cost, as also from the simplicity of its design, and the ease with which it is managed. There are, however, some objections to it, which increase with its size until they become positive evils. These are the position of the cylinder and the space occupied by the parts generally. As to the cylinder the fault is ineradicable; not only is it liable to be scored by the weight of the piston resting upon its bottom, and the accumulation of sediment or scale from the boiler which may be carried over with the steam, but it is exposed to much injury from the waste water which, in nearly all cases, collects at the bottom and sooner or later destroys its integrity. As a means, however, of converting a reciprocating motion into a rotary motion, it is undoubtedly capable of the greatest simplification. For light work its value is inestimable, and there are probably more of them built than of any other one kind.

The oscillating engine is very little used in manufacturing; what the reasons are we cannot say; one may be that it is not so economical as other plans from the difficulty which exists of attaching expansion valve gear to it without making it complicated and cumbrous. Of this kind of engine there are a great many in which the piston depends for its impetus upon steam admitted to its alternate sides by the vibration of the cylinder. This prevents any attempt to cause "lead" on the inducted steam, as in order to carry the cranks past their centers, the vapor must come in as soon as practicable after the completion of the previous stroke. The oscillating cylinder engine is used in most cases for navigation, and is in great favor with screw-propeller builders on account of their direct-action and economy of space.

The working-beam engine, or, in fact, all engines with upright cylinders, are the best where they can be employed. The reasons for this statement are the facts that the seat of the power is preserved from injury, from those causes which were represented as operating unfavorably in the case of the horizontal machine, also for the facility with which any modification of the apparatus for working the valves can be applied. We confess to a personal bias in favor of this class of engine; we think that the advantages which result from the ease with which all the reciprocating parts can be balanced, got at and seen at a glance when working, that is, in engines of a moderate size, more than compensate for the number of journals which are a necessary feature of them. Very little criticism can be brought to bear upon the beam engine that will stand when viewed in the light of common sense. The relative value of the three plans is based wholly upon the application of them to the work they are to perform; but we assert that if one individual was to try each separately, he would declare in favor of the vertical cylinder over all others.

Late English papers declare that the horizontal engines in the Great Exhibition recently held in London received the most attention and were the most popular, which we think a little singular in view of the facts above mentioned.

Beam engines may be regarded as the national idea of the proper way to apply steam power. Every nation has its own notions in regard to this subject. The English engineers went to great lengths in the construction of side-lever engines, which are nothing more than the principle of the working beam inverted. There may be a few more journals in the English plan than in ours, but they do not differ essentially. Until very recently these were regarded as the best possible system of propelling ocean ships, and all of their large sea-going steamers were supplied with them, as indeed were many of our own, built upon English plans somewhat modified to suit our peculiar valve gearing. Of late years screw propulsion has so much attracted the attention of foreign engineers that the side wheels have not been materially changed as to their propelling machinery. With us, however, the case has been essentially different; beyond the comparatively few side-lever engines built in this country, the national mechanical expression on the subject in question has almost always declared in favor of the over-head beam. All of our river and Sound steamboats are fitted with them, and are celebrated for their speed and economical qualities.

When it was proposed, in view of these facts, to fit out an ocean steamer with the previously specified plan of engine, the projectors were derided both at home and abroad. More particularly were we sneered and scoffed at upon the other side of the water as a nation who knew so little of engineering precedents as not to be perfectly aware that the beam engine was unfitted for sea service. The weight and top hamper would throw the ship on her beam-ends when she labored in the first strong gale of wind; she would part all her holding-down bolts, and that would be the last of the beam engine; besides which all sorts of accidents were predicted, but happily not generally verified. At the first glance it did indeed seem plausible that some of these inconveniences would be felt, and in order to demonstrate it practically the *North Star* (once Vanderbilt's yacht) was fitted out

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with twin engines of the above desccription, and not only went to Europe, but all through the Mediterranean, returning home without any disaster. The steamship *Golden Age*, having a beam engine of 83 inches diameter and twelve feet stroke, crossed the Atlantic and also circled the globe, completing her achievement without, as the captain tersely remarked, "knocking a chip off her sides."

Enough, however, has been said; the beam engines are not in the minority at sea, by any means; they are to be found in all our waters. A great many of the blockading vessels are fitted with them, and these have proved the fastest in the squadron, and we have never heard complaints from them on account of their engines of any kind. We have been to sea in many different ships; and the beam engines have always been highly popular with engineers, and will, we think, continue to be so for a long time to come.

THE LANCASHIRE DISTRESS---THE PROSPECTS OF THE PEOPLE.

The information which has been published respecting the sufferings of the operatives in Lancashire, England, has excited the generous sympathies of our people, many of whom have made large contributions to relieve the distressed. This is a noble movement. It is the duty of every man, who is able, to assist his fellow man in distress, no matter who he is, or where he may reside. In a question of humanity, all men are brethren But charity goes further than mere almsgiving. It takes cognizance of present relief with reference to future welfare. The "Good Samaritan" lifted up the wounded man whom he found lying by the wayside, and not only poured oil and wine into his wounds, but carried him to an inn and made arrangements with the landlord for his care until he recovered. Such is the example all men are commanded to follow, and it is to this point we wish to direct public attention for a brief space.

The aged and permanently-disabled poor must and should be objects of charity for life; but the able-bodied poor, who are suffering for want of labor, should be assisted for the present, to overcome a temporary evil in order to secure some mode of helping themselves for the future. It is indeed remarkable that men and women, not only in hundreds and thousands, but hundreds of thousands should be in want of food from lack of employment, when there is so much space in the world for their occupation. Over this the working people of Lancashire have no present control. Their occupation, which was their only estate, has been swept from them by events in which they had no voice and no part. This should not be overlooked, but as it respects the future, the people of England must be held responsible if they suffer without some efficient means being taken to secure them against the recurrence of such calamities. The distress in England has been caused by the war in America. About four millions of people in Great Britain were dependent upon the cotton manufacture when our Southern ports were blockaded; and in 1860, out of 3,366,680 bales of cotton imported from all countries, no less than 2,580,843 were furnished by America. As the cotton manufacture cannot be carried on without the raw material, we can easily conceive how many persons must be out of employment, when about eighty per cent of the raw material furnished annually by the Southern States has been cut off for a whole year. Lancashire is the chief seat of the cotton manufacture for the world. It has a population of about 2,500,000, and Manchester—the cotton metropolis—has a population of about 500,000, mostly engaged in the cotton business. The calamities of our war have reflected in a terrible manner upon these people, and we cannot but feel for them. Lanarkshire, in Scotland, also contains a large population devoted to the cotton manufacture, who are suffering, and though not to the same extent as those in England, still their condition is lamentable. But the important question arises—how long will this distress continue? It is very evident to us that if our civil war continues one, two or several years longer, with the Southern ports blockaded, the people of England will not be able to obtain from other countries one-half of the cotton necessary to keep their spindles in motion. Must hundreds of thousands of people in that country, then, be supported by charity, perhaps for years? It is unwise, yea the worst sort of charity, to sustain able-bodied men and women as paupers, when new avenues of business or labor may be opened up to them, whereby they may be enabled to provide for themselves. It is long since we formed the opinion that any country which does not raise sufficient food for its people, in ordinary seasons, is in an unfavorable condition for developing the best interests of its inhabitants. Great Britain has been in such a condition for many years, and our war has uncovered to the people the evils of her great manufacturing system. In our opinion, the only true and sure remedy for the English and Scottish working people, who are so dependent upon cotton manufactures, is to emigrate to other lands. There are several British colonies to which they may emigrate and better their condition; but above all, the great Western States and Territories of America offer the most favorable inducements for them. The climate is salubrious and the soil yields in profusion; there they will never be out of work and never suffer from want of food.

Any remedy which does not look to securing such results is futile. Norwegians, Swiss, Danes and Germans have emigrated in colonies to our Western States; they have founded thrifty villages and all have prospered. English operatives should do the same; speaking the same language they will become a homogeneous population with ourselves in a few years. It may be thought that persons brought up to factory life will never become successful farmers; this depends entirely upon themselves. If they are sober, moral and industrious, they will succeed. Several townships in Canada, which were settled by Scottish weavers, have become flourishing agricultural communities; the Lancashire operatives may secure equal success.

It is the duty of the wealthy people of England to assist these people to emigrate and to furnish them with means to overcome the difficulties of getting through the first year. After this they will need no assistance, but will be gradually gaining in ability to pay old debts. Let them come in thousands and tens of thousands. Here they can have free lands and homes for life—

"For Uncle Sam is rich enough to give them all a farm."

OUR USEFUL RECEIPTS.

Much satisfaction has been expressed with the series of useful receipts which has been published weekly in our present volume. It is our intention to continue the practice of furnishing similar information; and, as has been our custom, we shall select from the treasury of practical art only those receipts which are reliable, interesting and of general application. Having access to enlarged sources of information, and being in possession of much practical knowledge, we are enabled to cull and arrange such receipts as are trustworthy. Many receipts which have appeared in our columns have been worth more to thousands of our readers than the price of subscription to the Scientific American. Some of them have cost much labor to secure, and in many instances the substance of whole pages from printed works on chemistry has been condensed into a few lines. We have not merely given that which was old and good, but have searched the most recently-published works on science and the arts, to present the latest discoveries that were applicable to general purposes. As it has been in the past, so shall it be with us in the future; therefore our next volume will contain, in its columns of receipts, all the latest and best information that it is possible to present in relation to the practical arts.

DISABLING GUNS.

The object in spiking a gun is very generally misapprehended by persons unconnected with, and ignorant of, military details. It is not intended to utterly destroy the piece, but to render it useless for the time being, in case the gunners are forced to abandon it. To this end rat-tail files, patent spikes and a variety of different articles are used; these are, in nearly every instance, removed when the danger is past, either by the enemy if they have carried the battery by storm, or by the defenders of the post themselves if they have spiked the guns on the approach of danger.

It has also been proposed, and indeed practiced in a number of cases, to knock off the trunnions of the cannon either with a sledge or by firing solid shot at them from another gun at close range. Even this does not effectually ruin the ordnance unless the fracture should extend some distance into the re-inforce, as trunnions can be forged upon a hoop and shrunk over the piece, making it as strong as ever. A correspondent suggests that nitric acid be employed to eat away the vent, but as the presence of a bottle of this fluid would be slightly undesirable in an engineer's caisson, and moreover as it is quite useless for the purpose, being very slow in its action upon cast iron, we hardly think it could be satisfactorily used. What is required is an instrument that shall lock up the vent beyond the possibility of removal on the field, and we think this can be done as well by a spike properly made as by any other. Who will invent the best article for the purpose?

THE FORM AND CHARACTER OF PENETRATING PROJECTILES.

It is now a settled fact that it is as necessary to use a specific material for perforating iron plates as it is to give the projectiles a high velocity. A cast-iron shot is so brittle that it breaks into fragments when it strikes a thick iron plate. On the other hand, steel shot when moving at a less velocity than cast-iron shot, pierces thick iron plates without much difficulty. This is one important point settled for the new condition of things in maritime warfare, when ships are clothed with mail.

Another important point is the shape of the projectile. A few months ago only, it was held that smooth-bored guns firing round shot were more destructive to iron-clad vessels than rifled guns, because the velocity of the shot fired by the former is greater than that from the latter. In this case experiments have demonstrated, that rifled guns firing flat-fronted steel bolts exhibit greater penetrating power than round shot. These are important facts.

It is generally understood that Mr. Joseph Whitworth, of Manchester, England, is the inventor of flat-fronted, solid and hollow projectiles, and that he first practically applied them. This turns out to be a popular error. In a letter to the London *Engineer*, Captain Blakely states that the veteran inventor, Captain John Norton, so well known by repute and his communications to the readers of the Scientific American, is the real inventor of this kind of shot, and that he first practically applied it in 1832. While examining one of the old-fashioned arrow heads that were employed by the strong-armed archers of the days of chivalry, he noticed that it was flat-headed, and the idea crossed his mind that this form was adopted for piercing through the coats of mail worn by the warriors of the olden time. Acting upon this idea, he had a hollow steel bolt turned with a flat front, and he charged it like a shell. This was fired with an air-gun against a steel cuirass stuffed with sawdust and powder, at a distance of twenty yards, and it penetrated the cuirass and blew up the gunpowder behind it. This was done in 1832, in the presence of a number of officers at the Life Guards Barracks, Windsor.

The Polytechnic Association---Our Index.

The report of the Polytechnic Association with much other valuable matter is deferred until our next number, owing to the want of space; our columns being largely occupied by the extensive and elaborately-compiled "Index," which will be found to be more ample and comprehensive than any we ever previously published, and will doubtless be highly valued by thousands of our readers who have preserved their numbers for binding.

Mr. William S. Hadley, the inventor of the Tap Guide, illustrated in our columns recently, has removed from Philadelphia to Norwalk, Huron county, Ohio. All letters should be addressed to him at that place.

In our next number we intend to illustrate the model sewing-machine manufactory of the Wheeler & Wilson Manufacturing Co., at Bridgeport, Conn.

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ISSUED FROM THE UNITED STATES PATENT OFFICE

FOR THE WEEK ENDING DECEMBER 9, 1862.

Reported Officially for the Scientific American.

*** Pamphlets giving full particulars of the mode of applying for patents, under the new law which went into force March 2, 1861, specifying size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publisher of the SCIENTIFIC AMERICAN, New York.

37,082.—J. B. Barcolo, of Mount Morris, N. Y., for an Improvement in Grain Separators :

I claim the arrangement, in grain separators, of the oat board, B, having a longitudinal adjustment, in combination with the sieve, C, having an adjustable inclination, as described, and both operating conjointly with the blast, in the manner and for the purpose specified.

37,083.—Jacob Bickhart, of Harlan, Ind., for an Improvement in Gates :

I claim, first, The levers, F F, connected to the gate, A, through the medium of the arms, E E, the latter being connected to the gate and to the levers by means of hinges, and all arranged as shown for the purpose of opening and closing the gate, as set forth.

Second, The sliding bar, G, provided with a recess, k, at its under side in combination with the slot, l, in the top bar, d, of the gate for the purpose of serving as a fastening for the latter, as set forth.

Third, The combination of the sliding bar, G, levers, F F, arms, E E, and gate, A, all arranged as and for the purpose specified.

[This invention relates to an improvement in that class of gates which are designed to be opened by a person from a carriage or on horseback, so as to avoid the trouble and loss of time in alighting. The object of the invention is to obtain a gate of the kind specified, which may be secured in a closed state and effectually prevented from being deranged or thrown out of proper position by cattle or swine.]

37,084.—Henry A. Burr and L. E. Rockwell, of New York City, for an Improvement in Lubricators :

We claim the rotating cup or hollow wheel, substantially such as herein described, in combination with a shaft and journal box, and placed with its open end next to and extending over the end of the journal box, substantially as and for the purpose specified.

And we also claim, in combination with the rotating cup or hollow wheel on the shaft, and extending over the end of the journal box, the projecting flanch on the end of the journal box, substantially as and for the purpose specified.

37,085.—G. T. Comins, of Lowell, Mass., for an Improved Bed Bottom :

I claim the longitudinal elastic wooden slats, B, provided at their ends with oblong slots, a, fitted on pins, b, in the cross rails, c c, of the bedstead, substantially as and for the purpose herein set forth.

[This invention consists in forming the bed bottom of a series of longitudinal wooden slats provided with slots at their ends and fitted on pins in the cross rails of the bedstead, whereby a very elastic, strong and durable bed bottom is obtained, and one which may be readily applied to and detached from the bedstead and capable of having its slats inverted, so that when they become sprung and set at one side side they may be turned and brought by use into their proper form or shape.]

37,086.—Robert Cornelius, of Philadelphia, Pa., for an Improvement in Lamps :

I claim, first, The hook, s t, for securing the shade to the deflector and the deflector to the lamp, substantially as above described, or for the purpose of a handle merely to the deflector.

Second, The auxiliary vertical end guide pieces, f f, for directing the air at the ends of the flame and preventing it from expanding or burning irregularly.

37,087.—Edward Cotty, of Washington, D. C., for an Improvement in Artificial Knee Joints :

I claim the eccentric hinge formed of two parts representing the lower parts of the femur and the tibia, in connection with the adjustable spring, u, or any other substantially the same, representing the fibers of the exterior tendons, as set forth and described.

37,088.—S. R. Dimock, of Pittsfield, Mass., for an Improvement in Brakes for Railroad Cars :

I claim the arrangement of the oscillating frame, E, carrying the pinion, H, with its screw shaft, e, and spring, K, and the pinion, I, with the longitudinally sliding arbor, f, in combination with the cog wheel, J, on the axle, C, of the wheels of a railroad car, all constructed and operating substantially as and for the purpose herein shown and described.

And I also claim the arrangement of the dog, p, projecting from the pin, i, on the screw shaft, e, in combination with the pinion, H, and spring, K, as described, for the purpose of preventing the spring from unwinding any further than desirable.

[The object of this invention is to accumulate the power which is exerted in stopping a car and use such power for the purpose of facilitating the operation of starting the same.]

37,089.—L. H. Doyle, of Waterloo, Iowa, for an Improvement in Cultivators :

I claim the combination with the beam bar, A, and standards, E E of the adjusting bars, b d, in the manner herein shown and described.

[The object of this invention is to obtain a strong and durable cultivator of iron which will be light and capable of being readily adjusted or expanded and contracted laterally to suit the width of the rows of plants under cultivation.]

37,090.—A. G. Eddy, of Ashfield, Mass., for an Improvement in Churns :

I claim a rotary churn dasher composed of two beaters, G G, fixed in radial arms, d, attached to the dasher shaft, B, and parallel therewith, in combination with the beaters, K K, arranged to operate conjointly with the beaters, G G, as and for the purpose herein set forth.

[This invention relates to an improvement in the dasher of the churn which is of the rotary kind and consists in having radial arms attached to the upper and lower part of the shaft, between which arm the beaters are fitted, there being four in all, two being stationary and having a radial position with the shaft, while the other two are arranged in such a manner as to have a rotary motion on their axis independent of that caused by the rotation of the dasher shaft, but produced by the rotation of the latter.]

37,091.—A. T. Freeman, of Binghampton, N. Y., for an Improvement in Revolving Fire-arms :

I claim the cylinder axis pin constructed of two pieces, C C′, with a shoulder, c, a T-head, b, and a tongue, b′, and applied in combination with the cylinder and the frame of the fire-arm, substantially as herein specified.

[This invention consists in a certain novel construction of and mode of applying the cylinder axis pin, whereby facility is afforded for removing and replacing the cylinder without any danger of losing the pin.]

37,092.—William Fulton, of Elizabeth, N. J., for an Improvement in Cooking Apparatus :

I claim, first, The construction of the valves in extinguisher, C, or their equivalent, as shown at S and V, in Fig. 6, for producing a gas-light, and regulating the action of the flame, either partially or wholly extinguishing it.

Second, I claim the construction of cones, D, or their equivalent, as shown in Fig. 3, for spreading the flame and admitting the air thereto, in combination with the extinguisher, C, shown, in Fig. 6.

Third, I claim the cone, F, or its equivalent, as shown in Fig. 8, for producing a gas-light from the fuel when placed over cone, D, and fuel chambers, h.

Fourth, I claim the fuel chambers, h, or their equivalent, as shown in Fig. 3, in combination with pipes, g, in Fig. 4, for heating the water in reservoir, A, the whole being arranged substantially as and for the purpose herein set forth.

37,093.—Smith, Gardner & A. B. Howe, of New York City, for an Improvement in Cleaning Rice :

I claim one or a series of screws revolving in a cylinder and operating in conjunction with the disk or disks, substantially in the manner described and for the purposes set forth.

37,094.—William Gardner, of New York City, for an Improved Folding Metallic Bedstead :

I claim the folding mosquito frames, d d, in combination with the bedstead frame, a, in the manner shown, so that said frames, d d, fold clear of each other, as set forth.

I claim the variable braces, fitted as specified, in combination with the folding head or foot guards and bottom or frame, a, as set forth, whereby the inclination of said head or foot guards can be varied, as specified.

37,095.—Valentine Haeffner, of Dobb's Ferry, N. Y., for an Improved Artificial Cellar :

I claim the arrangement of two ice-boxes, C F, one on the top and one in the interior of a cellar or inclosed space, A, in combination with the tubes, D and E, all constructed and operating substantially as and for the purpose shown and described.

[The object of this invention is to lower, by artificial means, the temperature in a cellar or other inclosed space to such a degree that beer and other fermentable liquors can be preserved in the same with perfect safety, and also that the operation of brewing beer can be carried on throughout the whole year in the hot as well as in the cold season.]

37,096.—E. P. Haskell, of Harlan, Ind., for an Improved Machine for Bending Wood :

I claim the combination of the sliding pressure roller, D, slide, B, screw, C, plate, F, and guide, J, with the rotary pattern, G, in the manner herein shown and described.

[This invention consists in the employment of an adjustable pressure roller in connection with a pivoted pattern of semi-circular form and guides and clamps, all arranged in such a manner as to admit of the desired work being performed very expeditiously and with but little labor.]

37,097.—Z. G. Hurd, of Eldorado, Iowa, for an Improved Mill-stone Dresser :

I claim, first, The arrangement of the hinged holder, H, in combination with the trip lever, A, and pick, B, constructed and operating substantially as and for the purpose specified.

Second, The arrangement of the V-shaped seat, p, and triangular wedge, p′, in combination with the holder, H, and pick, B, as set forth.

Third, The arrangement of the spring lever, I, in combination with the trip lever, A, as and for the purpose described.

[This invention consists in the employment of a pick arranged in a trip lever, which is fulcrated on a laterally sliding arm and to which an oscillating motion is imparted by a trip wheel which is connected by a forked rod with said laterally sliding arm, and partakes of its motion in combination with a longitudinally sliding frame, in such a manner that the pick can be made to act on the entire surface of a mill, stone, and the latter can be dressed with little trouble and exertion and in a much shorter time and more uniform than by hand.]

37,098.—E. M. Judd, of New Britain, Conn., for an Improvement in Railroad Car Brakes :

I claim the barrel, f, and ratchet wheel, g, in combination with the lever, h, and pawls, i k, substantially as and for the purposes specified.

37,099.—E. M. Judd, of New Britain, Conn., for an Improvement in Trucks for Railroad Cars :

I claim arranging a series of axles, in a truck for cars, parallel to each other and fitted with the wheels at opposite ends of the alternate shafts, substantially as and for the purposes specified.

37,100.—Thomas Lane, of San Francisco, Cal., for an Improvement in Potato-diggers :

I claim, first, The arrangement of the shovel, O, screw bolts, R R, pinions, k k m n, crank, o, and axle, P, for raising and lowering the shovel, in combination with the frame, A, and revolving buckets, b D, operating in the manner and for the purpose described.

Second, The shaking shoe, K, chute board, e, and revolving buckets, b D, in combination with the shovel, O, and hoppers, M, provided with tilting bottoms, q, when arranged and operating in the manner and for the purpose described.

[This invention relates to certain improvements in machines for digging potatoes and onions and putting the same into racks, and it consists in the manner of arranging the scoop or shovel so that it can be adjusted to enter the ground at a greater or less depth ; also in the peculiar arrangement of the shaking shoe and hoppers.]

37,101.—Mark Levy, of New York City, for an Improvement in the Manufacture of Illuminating Gas :

I claim the arrangement of mixing the gases, generated in separate retorts, from wood and from oil, or its equivalent, and then re-heating the thus-mixed gases before the same are allowed to pass into the purifier and gasometer, in the manner and for the purpose substantially as described.

37,102.—Dioclesian Lewis, of Boston, Mass., for an Improved Book Rack :

I claim, first, the combustion of the rack 1, 2, brace 3, and strap, 5, as hereinbefore set forth.

Second, The combination with the rack, 1, 2, of the bar, 7, as described.

Third, The combination with the rack, 1, 2, and bar, 7, of the fingers, 9, 9, for the purpose and in the manner set forth.

37,103.—D. G. Littlefield, of Albany, N. Y., for an Improvement in Stoves. Ante-dated Nov. 26, 1862 :

I claim the mill grate, A B, constructed and operating substantially as and for the purposes herein specified.

I also claim the construction of the fire-pot, D, with outwardly projecting combustion mouths or outlets, d d, opening immediately into and in combination with the chamber, E, for the purpose herein specified.

I also claim the form and arrangement of the case, M, in relation to and in combination with the fire-pot, D, and chamber, E, substantially as and for the purposes herein set forth.

I also claim compelling the draught to pass upward through the supplying cylinder, H, while kindling the fire in the stove, and immediately previous to as well as during the act of replenishing the cylinder with coal, for the purpose specified, and this irrespective of the special construction by which the same is effected.

I also claim the central chamber above the supplying cylinder, H, communicating with the exit flue, p, whereby any air that passes into said chamber by the cover, R, is conveyed to the exit flue, as specified.

I also claim the divided flue, M, around the chamber, I, and forming a communication between the front of the chamber, E, and the exit flue, p, whereby the products of combustion are conveyed to the chimney without interfering with the action of the said chamber, and the radiation of heat from the stove is properly distributed, as herein set forth.

I also claim the sliding plate or valve, N, so arranged that it necessarily closes the opening, o, from the chamber, E, to the flue, K, when the aperture, n, from the supply cylinder, H, to the central chamber I, is opened, and *vice versa*, whereby the draught is directed at pleasure, either up through the chamber, E, or the supply cylinder, H, for the purposes herein set forth.

37,104.—David Maydole, of Norwich, N. Y., for an Improvement in Skates :

I claim the hook, F, attached to or formed on the plate, E, at the back part of the skate, in combination with the plate, G, attached to the heel of the boot or shoe and provided with parallel slots, c c, or any equivalent staple to receive the hook, F, when used in connection with any suitable fastening for holding the front of the skate against the sole of the boot or shoe, substantially as and for the purpose specified.

37,105.—O. W. Morley, of Ellisburgh, N. Y., for an Improved Buckle :

I claim the combination of the hinged plate, B, and crossbar, b, with the frame, A, and pin, C, in the manner herein shown and described.

37,106.—Morgan Payne, of Cardington, Ohio, for an Improvement in Churns :

I claim the shaft, A, in connection with the rod, B, and dashers, e e, and the arm, C, with the dashers, d d, the whole arranged in the manner and for the purpose herein specified.

37,107.—S. S. Putnam, of Dorchester, Mass., for an Improvement in Machines for making Nails for Horse-shoes :

I claim, first, In combination with a revolving cam for operating four hammers in pairs of two, the arranging of said cam behind the pivots of the hammer helves, for the purpose of protecting said cam and its coöperative parts from the scales and heat of the nail-rods and hammers, and thus protecting them from cutting, wearing and undue friction, by the drying or burning of the oil, substantially as described.

Second, I claim the method substantially as herein described of operating the cutter, n, viz., by the lever, M, and slotted lever, O.

Third, I claim the block, T, and its connections for stopping and holding the hammers, substantially as specified.

Fourth, I claim regulating the throw of a pair of hammers by applying thereto the power of a supplementary spring, substantially in the manner set forth.

Fifth, I claim operating the gage lever, V, by the lever U, which forms part of the device for arresting the hammers.

37,108.—S. J. Reeves, of Philadelphia, Pa., for an Improvement in Fagots for Wrought Metal Cannons, Hydraulic Pumps, &c. :

I claim the making of the bore on which the sheets are wound and welded of sufficient size to margin the bore of the gun when finished, substantially as and for the purpose described.

37,109.—James Robinson, of Barnegat, N. J., for an Improved Cable Stopper :

I claim the arrangement of the hinged claw, A, in combination with the rod or stem, B, dog, C, and foot lever, D, all constructed and operating substantially as and for the purpose shown and described.

[This invention consists in the arrangement of a hinged forked claw, the shank of which catches under a hinged dog, which is connected to and operated by a foot lever, in such a manner that the claw when brought to catch over a link of the cable retains the same firmly and prevents it running out, and that, by depressing the foot lever, the shank of the claw is released and the cable freed.]

37,110.—J. F. Rochow, of New York City, for an Improvement in Hoisting Apparatus :

I claim the arrangement of the differential wheels, a b, in combination with the box, C, main shaft, B, tumbling shaft, D, with pinions, c d, and drum, E, all constructed and operating substantially as and for the purpose herein shown and described.

And I also claim the tumbling shaft, D, when the same is arranged with two wheels or pinions, c d, to operate in combination with the wheels, a b, substantially in the manner and for the purpose set forth.

37,111.—Anson Rowe, of Atalissa, Iowa, for an Improvement in Grain Separators :

I claim, first, The plate, K, placed on or over the upper riddle, H, and in relation with the feed-board, D, and fan, L, as and for the purpose specified.

Second, The combination of the sieve, M, riddles, H H, plate, K, feed-board, D, and fan, L, arranged for joint operation as and for the purpose herein set forth.

[The object of this invention is to obtain a grain separator of simple construction, which will operate more efficiently than those previously constructed, and be not liable to get out of repair. Devices of this kind as hitherto constructed have generally required considerable power to operate them, and have been quite liable to become deranged by use, the screens liable to choke or clog, and many impurities allowed to pass off with the grain—difficulties which it is believed are fully obviated by this invention.]

37,112.—Thomas Sault, of Seymour, Conn., for an Improved Machine for covering Wire with Gutta-Percha, Rubber, &c. :

I claim, first, The combination of a cylinder, A, a hollow screw, B, and a central mandrel, C, passing through the hollow screw, substantially as herein specified.

Second, The construction of the cylinder, A, containing the screw, B, with a throat, c, and internal cavity, b, arranged substantially as and for the purpose specified.

Third, Feeding the wire to be covered with the gum by the movement of the gum itself produced by the screw, B, or other device for forcing it through the forming die, substantially as herein specified.

[The main object of these improvements is to effect the covering of wire of any length with caoutchouc, gutta-percha, or the allied gums or compounds thereof, or the manufacture of tubing of any length o such gums or compounds by an uninterrupted operation. The principal portion of the machinery to which the improvements relate, consists of a screw working in the bore of a cylinder into which the gum is fed, and from which it is forced by the screw through or into a die of the necessary size and form to produce the exterior of the covering tube or other article to be manufactured. For the covering of wire or the manufacture of tubing, the screw is made hollow for the reception of a mandrel through which the wire to be covered passes, or upon which the interior of the tubing is formed, and it is in the combination of the mandrel with the so-applied screw and cylinder that one part of the invention consists. Another improvement consists in a peculiar construction of the cylinder, whereby it is enabled to be supplied with gum without stopping the operation of the screw, and thereby enabled to operate continuously to make a tube or cover or wire of any length, or to fill a mold of any size. A further improvement consists in feeding the wire to be covered with the gum, by the action of the aforesaid screw or other forcing apparatus upon the gum itself.]

37,113.—George Sherwood and H. M. Sherwood, of Chicago, Ill., for an Improvement in fastening the Covers of Ink-wells :

We claim fastening the covers of ink-wells thereto by means of pins, a a, with enlarged heads acting against the inclined edges of concentric slots, f f, in the raised flange, E, of the well, substantially as and for the purpose herein specified.

37,114.—W. C. Shipherd, of Saratoga Springs, N. Y., for an Improvement in Lasts :

I claim the spring catch, E, in combination with the polygonal plate, E′, said parts being constructed and arranged substantially as and for the purpose specified.

[This invention relates to a new and improved mode of attaching the removable block of the last to the latter, in such a manner that it

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may be detached from the last by the hook which is usually employed for drawing the last from the boot or shoe, thereby avoiding the trouble and delay hitherto attending the loosening or detaching of the block from the last, previous to the withdrawing of the latter from the boot or shoe.]

37,115.—Edward Stern, of Dorchester, and J. S. Newell, of Newton, Mass., for an Improvement in Button-hole Cutters:

We claim a button-hole cutter as made with a triangular or trapezoidal bed, B, so arranged and applied with respect to the cutter, A, as to be capable of being moved in one plane and transversely of such cutter, substantially as described.

We also claim the adjustable gage, K, in combination with the bed, B, and the cutter, A, arranged in manner and so as to operate together substantially as specified.

We also claim the auxiliary or secondary gage, L, in combination with the cutter, A, and the bed, B, the latter being constructed and arranged so as to operate substantially as specified.

37,116.—Le Roy Sunderland, of Boston, Mass., for an Improvement in Spermatorrhœa Rings:

I claim, first, The use of an adjustable elastic spring lever, or levers armed with sharp points or teeth, and arranged substantially as herein described and for the purpose set forth.

Second, The combination of the ring, a, and spring lever or levers, b, arranged together, substantially as herein described, and forming a seminal guard to be used for the prevention and cure of spermatorrhœa.

37,117.—W. R. Thomas and M. Emanuel, Jr., of Catasauqua, Pa., for an Improved Composition for Blasting Powder:

I claim the blasting compound made of nitrate of soda, sulphur, chlorate of potash, starch and ground bark, or other absorbent carbonaceous material, substantially in the manner and in about the proportions herein specified.

37,118.—Joel Webster, of Brooklyn, N. Y., for an Improved Sad-iron:

I claim the thumb-lever, M, in combination with the uprights, E and E′, and main portion, A, substantially as described.

37,119.—L. C. White, of Waterbury, Conn., for an Improved Fastening for Lamp Chimneys:

I claim, first, The peculiar construction of hawks-bill, B, or its equivalent, as shown in Fig. 1, Fig. 2, Fig. 3 and Fig. 4, and the mode of throwing it either backward or forward, and holding it in either position by means of the wire-lever, J, or its equivalent, the ends of said lever being loose in perforations, h and k.

Second, I claim the middle projectile or tooth, f, or its equivalent, as shown in Fig. 1, Fig. 2 and Fig. 4, which throws the hawks-bill forward by gently pressing the base of the chimney upon it, independently of the upper projectile, e, which secures the chimney to the burner.

Third, I claim the position and the peculiar construction of the lever, J, or its equivalent as shown in Fig. 1 and Fig. 2, which throws the hawks-bill either backward or forward.

Fourth, I claim the hawks-bill, B, or its equivalent, in combination with the mode of attaching it to the burner without solder, by means of the bolt supports, d, formed in the shell of the burner as shown in Fig. 5, the whole being arranged substantially as and for the purpose herein described.

37,120.—W. J. Wilcox, of New York City, for an Improved Apparatus for Cooling Lard:

I claim, first, The application or use, in combination with an apparatus for refining lard, of a worm, C, enclosed in a cask, D, constructed and operating substantially as and for the purpose herein described.

Second, The arrangement of the regulating cock, g, in combination with the worm, C, cask, D, overflow pipe, e, heating pan, A, and cooling vat, E, all constructed and operating as and for the purpose specified.

37,121.—F. R. Wilson, of Auburn, Cal., for an Improvement in Machines for Upsetting Tires:

I claim the jointed levers, B B, in combination with the adjustable guides, J J, the levers, B B, being connected to a pivoted bar, D, having a lever, E, attached and all arranged to operate as and for the purpose herein set forth.

[This invention consists in a novel and improved arrangement of levers and adjustable guides, whereby tires for wheels may be very expeditiously upset or shrunk to the proper size without cutting and rewelding, and the machine readily adapted for operating upon tires of different sizes or diameters.]

37,122.—W. W. Wright, of Killingly, Conn., for an Improved Shoe Knife:

I claim combining with the blade of the knife, a guard and wheel or tumbler, in the manner set forth, viz., by forming the guard as described, and screwing it to the blade of the knife with the dent in the flat end thereof, on the point of the knife and the bar at the other end thereof, resting on the wheel or tumbler, as described.

37,123.—W. P. Barker (assignor to himself, James Van Buren and Nelson Burchard), of Grand Rapids, Mich., for an Improvement in Grain-binders:

I claim, first, The traveling or reciprocating hooks, H H, attached to the endless belts, E E′, in combination with the arm, J″, provided with the nippers, m m′, and the elastic band, C*, attached to the bar, A′, and arm, J″, all arranged to operate as and for the purpose set forth.

Second, The shafts, V W, the former being provided with the screw, v, fork, h′, and the latter provided with the hook, Y, knife or cutter, X, and the fork, w, said shafts being operated as shown, and in connection with the arm, J″, and the cord or rope, K, for the purpose specified.

Third, The combination of the hooks, H H, arm, J″, provided with the nippers, m m′, elastic band, C*, shafts, V W, and the cord or rope, K, all combined and arranged to operate as and for the purpose herein set forth.

[The object of this invention is to obtain a device for binding grain, which may be connected to and arranged to operate in conjunction with an ordinary reaper, so that the grain as cut by the reaper may be gathered into gavels and bound into sheaves; the latter being discharged from the machine, and the whole work peformed automatically and operated by the draught movement of the machine.]

37,124.—J. H. Baird, of Waterbury, Conn., assignor to Jedediah Wilcox, of New York City, for an Improvement in Apparatus for Applying Clasps to Skirts:

I claim the combination of a hoop-rest, a clasp-feeder, a clasp-supplier, and a moving clasp-carrier, the combination as a whole operating substantially as set forth.

I also claim the combination of a clasp-carrier with the clasp-supplier, in such manner that the clasp-carrier forms a gate or stop, to prevent the escape of clasps, the combination as a whole operating substantially as set forth.

I also claim the combination of a clasp-carrier with the hoop-rest, in such manner that the clasp-carrier forms one of the members by which the clasp is clinched upon the hoop.

37,125.—W. F. Cochrane (assignor to himself and Warder & Child), of Springfield, Ohio, for an Improvement in Grain Threshers and Separators:

I claim, first, Mounting the fans directly upon the cross-shaft or counter-shaft, from which the remainder of the mechanism is driven, substantially in the manner described for the purposes set forth.

Second, The combination of the line-shaft, counter-shaft and fans, substantially as and for the purpose described.

Third, Driving the threshing-cylinder directly from the fan-shaft, substantially in the manner described.

37,126.—W. F. Cochrane (assignor to himself and Warder & Child), of Springfield, Ohio, for an Improvement in Grain Threshers and Separators:

I claim, first, The combination of the grain-belt, straw-carrier and picker-shaft, when arranged and operated in the manner and for the purpose set forth.

Second, A supplementary threshing-cylinder, located beneath the grain-belt for the purpose of threshing out any heads which may escape the threshing-cylinder, when arranged and operating as herein described.

Third, The combination of the supplementary cylinder and the fans with the inclined boards, J J′, substantially in the manner described for the purpose set forth.

Fourth, The combination of the inclined boards, J J′, and regulating-valve, K, with the fans, D, as described for the purpose of regulating the blast, as set forth.

37,127.—W. F. Cochrane (assignor to himself and Warder & Child), of Springfield, Ohio, for an Improvement in Grain Threshers and Separators:

I claim, first, Mounting the blades of the fans directly upon the counter-shaft and inside the driving pulleys, substantially in the manner described for the purpose set forth.

Second, Driving the threshing cylinder directly from the fan-pulleys, substantially as and for the purposes set forth.

Third, Enclosing the main portion of the driving mechanism within the fan-case, for the purpose described.

Fourth, Making a portion of the fan case removable, as described, for the purpose of affording access to the driving mechanism.

37,128.—W. F. Cochrane (assignor to himself and Warder & Child), of Springfield, Ohio, for an Improvement in Grain Threshers and Separators:

I claim, first, Mounting the line-shaft, through which motion is communicated to the mechanism from the prime mover, in or upon a swinging bracket pivoted to the countershaft, and capable of twining freely round it in a vertical plane, substantially in the manner described.

Second, Inclosing the swinging bracket within the fan case, substantially in the manner and for the purposes described.

Third, The use of diagonal bracing on the front end of the frame, in combination with a line-shaft having vertical play, substantially as described and for the purpose set forth.

37,129.—W. F. Cochrane (assignor to himself and Warder & Child), of Springfield, Ohio, for an Improvement in Grain Threshers and Separators:

I claim, first, The combination of the diagonal braces, b2, and screw rods, b3 b4, with the longitudinal beams, b, in the manner and for the purpose described.

Second, The combination of the dispersing boards and supplementary cylinder, substantially as described and for the purpose specified.

Third, Mounting the shafts and gearing by which the straw-carrier and picker-shaft are driven in a solid metallic frame on each side of the grain-belt frame, as and for the purpose described.

37,130.—W. F. Cochrane (assignor to himself and Warder & Child), of Springfield, Ohio, for an Improvement in Grain Threshers:

I claim, first, Mounting the fans directly upon the cylinder shaft, and inside the threshing cylinder, substantially in the manner described, for the purposes set forth.

Second, The combination of an open-barreled cylinder having fans in its ends, with the blast spouts, when arranged and operating substantially in the manner herein described, for the purpose specified.

37,131.—W. F. Cochrane (assignor to himself and Warder & Child), of Springfield, Ohio, for an Improvement in Grain Threshers and Separators:

I claim, first, Constructing an independent frame or trough inside the grain-belt frame, substantially in the manner described, so as to form a space in which to locate the driving pulleys, &c.

Second, In combination with an independent frame, I claim driving the grain-belt, straw-carrier, heater and picker from the conveyer-shaft, substantially in the manner and for the purpose described.

37,132.—W. F. Cochrane (assignor to himself and Warder & Child), of Springfield, Ohio, for an Improvement in Grain Threshers and Separators:

I claim, first, The combination of the counter shaft and swinging jack, when arranged and operating substantially as and for the purpose set forth.

Second, The combination with a swinging jack of both a horizontal and a vertical driving-shaft, substantially in the manner and for the purposes described.

Third, The combination of the pipe-boxes in which the counter-shaft turns, with the side branches of the swinging jack, substantially in the manner described, for the purpose of relieving the shaft from the weight of the jack, as set forth.

37,133.—J. H. Harnly (assignor to himself, Jacob Harnly, G. R. Hendrickson and H. B. Dunlap), of Penn Township, Pa., for an Improvement in Rakes for Harvesters:

I claim, first, The combined action of the crank arm and its clutch, C, by means of the spring, c, pressing it against the lugs on the axle, a, and the terminus of the rod, E, connected with the ratchet lever, D g, pressing the clutch out, thereby jointly controlling the crank motion.

Second, I claim the combined foot lever, G, with its rod, F, operating against the jointed ratched lever, E D q, for regulating the speed of the rake at will, applied in the manner specified.

Third, I claim the rack bar, B, with its hook at one end and eccentric attachment to the axle at the other, in combination with the ratchet lever, D q, click rod, O, and connecting rod, M, arranged in the manner and for the purpose specified.

Fourth, I claim the rock-shaft, U, with its curved rake support, W, in combination with the tripper rod, P, rods, O M, and notched post, t, operating in the manner and for the purpose specified.

Fifth, I claim the arrangement and combination of the crank arm, C, with the connecting rods, K L, vibrating bar, I, and notched spring rod or holder, z, all operating in unison with the rack bar, B, by the revolution of the driving wheel on its axle, A, in the manner set forth.

37,134.—G. H. Johnson (assignor to himself and W. S. Sampson), of New York City, for an Improvement in Grain Bins:

I claim, first, The combined arrangement of the smaller cylinders, B, with the larger ones, A, for the purposes of utilizing the space between the larger ones for storage purposes, and rendering the whole structure more capable of sustaining the pressure of the contents of the cylinders, substantially as described.

Second, I claim the method of interlocking the layers of horizontal bond plates, a b, in the manner and for the purposes described.

Third, I claim the employment of ventilating flues, C, in combination with the grain bins, substantially as described.

37,135.—S. N. Long (assignor to the Chatham Lock Company), of South Chatham, Mass., for an Improvement in Locks:

I claim the bolt, C, formed of a series of tumblers a, in combination with a key provided with an extension bit, F, and a cam-shaped pin or pintle, D, or its equivalent, all arranged as and for the purpose herein set forth.

37,136.—Moses Marshall, of Lowell, Mass., assignor to S. S. Bucklin, of Brookline, Mass., for an Improved Machine for Pegging Boots and Shoes:

I claim the combination of the sleeve, G, with the plunger, B, and spring, C, operating in the manner substantially as described.

37,137.—John McCall, of London (Houndsditch), and B. G. Sloper, of Walthamstow, England, assignors to C. J. Underwood and W. J. Underwood, of Boston, Mass., for an Improvement in Preserving Articles of Food. Patented in England Oct. 24, 1861:

We claim the within-described process of preserving articles of food by the introduction of sulphite of soda or its equivalent into the cans in which the articles are preserved, in the manner and for the purpose herein described.

37,138.—Franklin Perrin, of Cambridge, Mass., assignor to himself and D. C. Perrin, of Roxbury, Mass., for an Improved Manufacture of Palm-leaf Fabric:

I claim the new or improved fabric or manufacture, as made with warps of spun thread in pairs, and its weft of strips of palm leaf arranged together, substantially as described.

37,139.—W. S. Sampson (assignor to himself and G. H. Johnson), of New York City, for an Improvement in Grain Bins:

I claim forming the bricks, or block of composition with tongues and grooves, or their equivalents, substantially as described, in combination with the plates, B, and rods, a, as and for the purposes hereinbefore fully described.

37,140.—A. C. Ainger and S. W. Webster (assignors S. W. Webster, aforesaid), of Stockholm, N. Y., for an Improvement in Cheese Frames:

We claim the removable back, h i, constructed as described, and employed in connection with the pivoted frame, d e f, in manner substantially as and for the purposes set forth.

[The subject of this invention is a pivoted frame of shelves, adapted for the storing of cheeses in such a manner that they may be exposed to a free circulation of air, and may be turned, rubbed, greased and receive all other necessary attention without the neccssity of lifting them by hand from the time they are made until ready for market.]

37,141.—E. S. Maynard, of Hancock, N. Y., for an Improvement in Sleigh Brakes:

I claim the combined arrangement of the brake, A, with lever, B B, and jointed bars, P T, when connected with the cogged wheel, Q, and roller moving in the slot, D, the whole operating and constructed in the manner described.

37,142.—L. F. Smith, of Stonington, Conn., for an Improvement in Tools for forming the Necks of Bottles:

I claim, first, The lever, E, constructed, used and operated substantially as and for the purpose specified.

Second, The combination of the lever, E, with the center piece, D, the several parts being arranged as specified for forming shoulders in bottle necks, as set forth.

37,143.—G. G. Evans, of Philadelphia, Pa., for an Improvement in Shoulder Straps for Officers:

I claim, first, The combination of the border plate, A, the detachable back plate, B, the studs, c, and eyelets, e, arranged and operating substantially as described.

Second, In combination with the above, the stud composed of the slotted link, L, tube, m, spring, n, collar, P, and screw, R, substantially as described.

37,144.—Joseph Ridge, of Richmond, Ind., for an Improvement in Kerosene or Coal-oil Lamps:

I claim, first, The diaphragm, D, and cylinder, M, united in one piece of glass, substantially as represented, and constructed in the manner and for the purpose herein set forth.

Second, I claim the said diaphragm and cylinder, in combination with the base and metallic frame, support and guard, and short chimney, C, substantially in the manner and for the purpose represented by the drawing and model, and set forth in this specification.

37,145.—E. D. Williams of Philadelphia, Pa., for an Improvement in Elongated Bullets:

I claim, first, The combination with elongated expanding bullets of a pin, C, and expanding disk, B, applied and substantially as herein specified.

Second, Fitting the pin to the cavity of the bullet in the manner substantially as herein specified, whereby the expansion of the bullet is caused to commence in the front part of its expanding portion and to be gradually continued toward the rear, as herein set forth.

RE-ISSUES.

1,358.—Joseph Renard, of Lyons, France, for an Improvement in Treating Aniline to produce a Red Coloring Matter or Dye. Patented April 8, 1859:

I claim the treatment of aniline, in combination with a metallic salt, or the equivalent thereof, with heat, substantially as described, to produce a red, in contradistinction to a purple or bluish coloring matter or dye, as set forth.

1,359.—Joseph Renard, of Lyons, France, for an Improved Red Dye from Aniline. Patented April 8, 1859:

I claim the new substance or red dyeing matter produced by subjecting aniline and a metallic salt, or the equivalent thereof, to a high temperature, substantially as described.

1,360.—N. A. Rhoads, of Waterbury, Vt., for an Improved Clothes-wringer. Patented March 11, 1862:

I claim in a clothes-wringing machine provided with elastic rollers, the construction of either or both of such rollers, or in other words, the arrangement of their operating surfaces, so that they may be at a greater distance asunder at their middle than at their ends, the whole being substantially in the manner and for the purpose as herein described.

I also claim the arrangement and combination of the connection and bearing bar, G, with the rubber springs, g g, the shaft, H, and its cams, h h, the whole being applied to the frame, A, and its rollers, D D′, substantially as described.

I also claim the arrangement of the shaft, L, and its arms, l l, with reference to the rollers, D D′, the frame, A, and the two bars, J J, or their equivalents, affixed to the said frame.

1,361.—N. A. Rhoads, of Waterbury, Vt., for an Improved Clothes-wringer. Patented March 11, 1862:

I claim the connection of each of the bars, J J, with the frame, A A, by means of the adjustable screw, M, whereby the distance of the bar, J, from the frame, A, may be increased or dimished as circumstances may require, substantially as herein set forth.

1,362.—C. A. Miller, of Philadelphia, Pa., assignee of W. S. Kirkham, of Branford, Conn,, for an Improvement in Locks and Latches. Patented March 15,1859:

I claim the keeper, D, having two inclined planes in combination with a latch, so pivoted to a janus-faced lock, and so arranged in respect to the inclination of the keeper, that whether the latter be applied to a left or right-handed door casing, one or other of the said inclined planes shall, on closing the door, cause the latch to move on its pivot, and direct the outer end into or behind the keeper, as described

DESIGNS.

1,675.—J. W. Burt, of New York City, for a Design for an Anklet.

1,676.—J. B. Chargois, of New York City, for a Design for a Trade-mark.

1,677.—David Foyer, of Dover, N. H., assignor to Abraham Folsom & Son, of Boston, for a Design for a Floor-cloth Pattern.

1,678.—H. S. and A. S. Hubbell, of Buffalo, N. Y., for a Design for a Cook's Stove.

1,679.—H. S. and A. S. Hubbell, of Buffalo, N. Y., for a Design for a Cook's Stove.

1,680.—H. S. and A. S. Hubbell, of Buffalo, N. Y., for a Design for a Cook's Stove.

1,681.—N. E. Russell, of New York City, for a Design for the Handles of Table Cutlery.

1,682.—J. W. Schreiber, of New York City, for a Design for a Lamp Chimney.

1,683 to 1,694.—H. G. Thompson, of New York City, assignor to the Hartford Carpet Company, for 12 patents for Designs for Carpet Patterns.

Binding the "Scientific American."

It is important that all works of reference should be well bound. The Scientific American being the only publication in the country which records the doings of the United States Patent Office, it is preserved by a large class of its patrons, lawyers and others, for reference. Some complaints have been made that our past mode of binding in cloth is not serviceable, and a wish has been expressed that we would adopt the style of binding used on the old series, *i. e.*, heavy board sides, covered with marble paper and morocco backs and corners.

Believing that the latter style of binding will better please a large portion of our readers, we shall commence on the expiration of this present volume to bind the sheets sent to us for the purpose in heavy board sides, covered with marble paper and leather backs and corners.

The price of binding in the above style will be 75 cents. We shall be unable hereafter to furnish covers to the trade, but will be happy to receive orders for binding at the publication office, 37 Park Row New York.

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Notes and Queries

J. H. D., of N. Y.—Finely-powdered plaster-of-paris made into a thin cement with water, we have been told, answers well for uniting broken pieces of meerschaum. Liquid quartz will answer the same purpose.

S. W. T., of N. J.—In a general sense, combustible substances are those which burn freely in the atmosphere, but in a chemical sense, this definition is too restricted. Iron and zinc burn freely in pure oxygen gas.

W. F. W., of Pa.—It depends altogether on the terms of the patent whether the patentee can substitute a different material, and still claim to work under the patent.

P. D. of Vt.—The benefit of a re-issue will extend to past assignees. They can however, if they prefer it, adhere to the original patent. It is not necessary that all should join in the application for re-issue, though it is usually better for them to do so.

F. A. M., of N. Y.—The *Monitor* class of vessels were not designed for speed, but merely for floating batteries. It would be wrong to blame them for want of speed, when they were not designed with respect to this quality. We shall give your article on storms attention. The theory appears to be similar to that of Mr. Redfield, who believed that most of our storms were rotary.

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